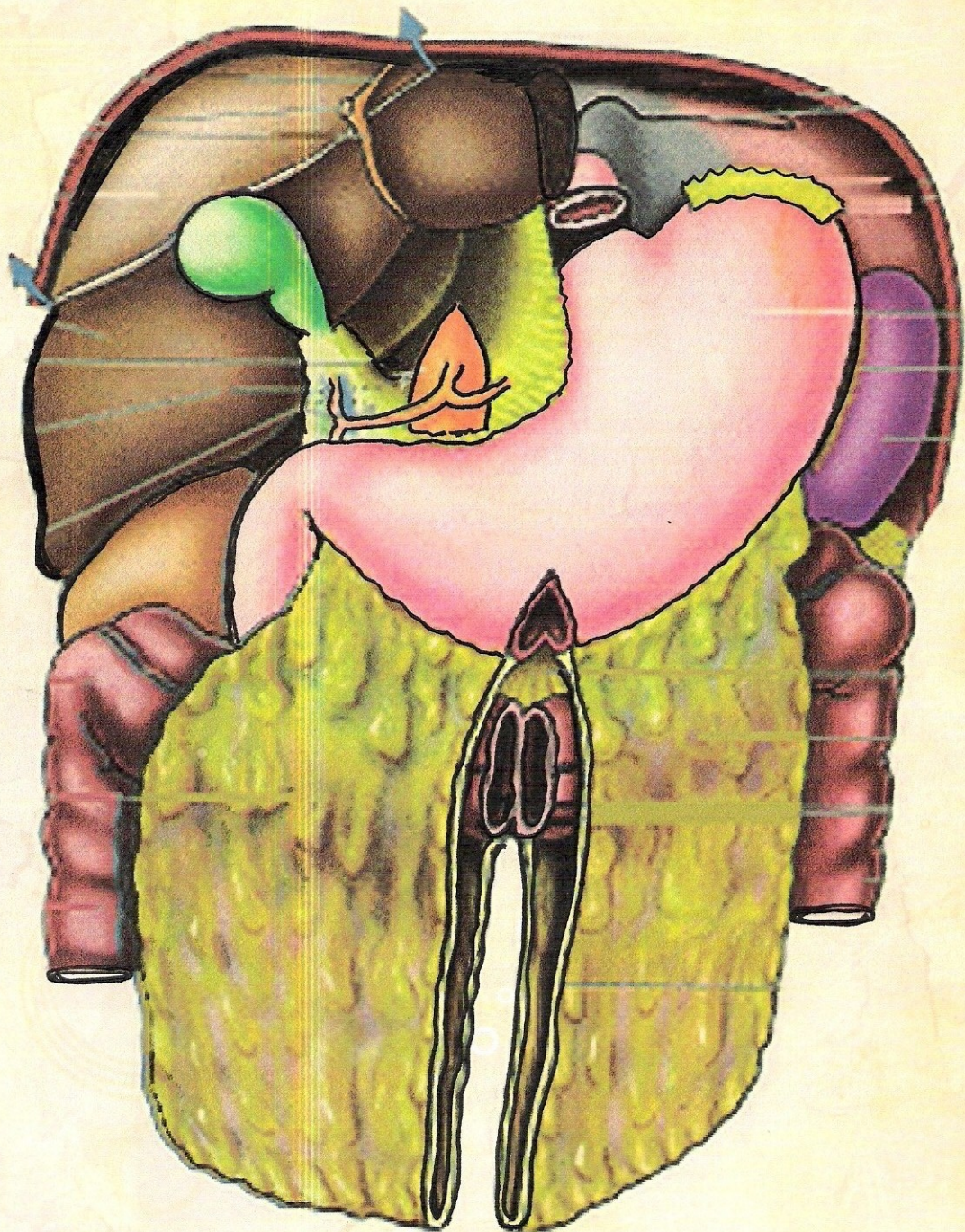




ABDOMEN

Dr : Khaled Milad

2010 - 11

VISIT...

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"CONTENTS"

من ① إلى ⑥7

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- Testis , epididymis ⑪
- Abdominal hernia ⑫
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مع تحياتي بالتوفيق د/فالح صابر



ABDOMEN

Part 1 : Abdominal wall.

د. محمد الميلاوي

ABDOMINO-PELVIC CAVITY :

- This cavity is divided into :

pelvis (a) - and abdomen proper (b)

- It's bounded by :

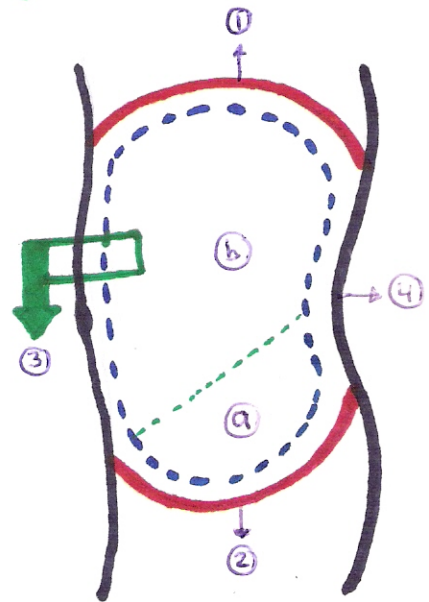
① superiorly → diaphragm ①

② Inferiorly → pelvic diaphragm ②

③ Anteriorly → ant. abd. wall.

④ Posteriorly → post- abd. wall.

⑤ laterally → extension of ant. abd. wall muscles.



ANTERIOR ABD. WALL

A.A.W.

part - 1

- The layers of ant. abdominal wall are :

① - skin → I

② - Superficial fatty layer

③ - Deep membranous layer } superficial fascia II

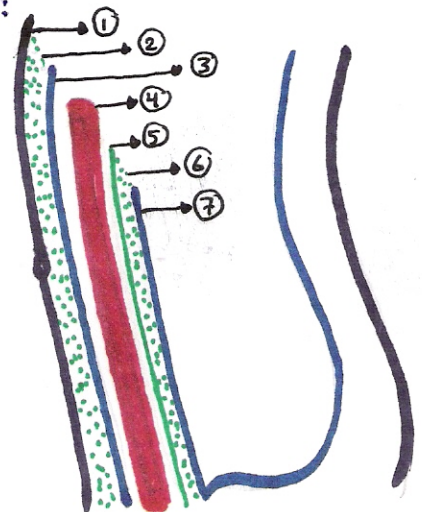
- Deep fascia

④ - abdominal muscles - III

⑤ - fascia transversalis - IV

⑥ - Extraperitoneal tissue - V

⑦ - parietal peritoneum - VI

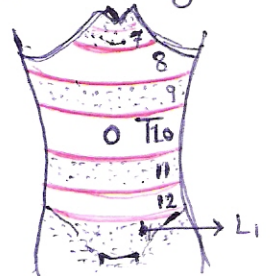


I SKIN:-

* cutaneous nerve supply of ant. abd. wall

is by lower 6 thoracic [lower 5 intercostal & subcosta] and by first lumbar (iliohypogastric & ilioinguinal) segmentally.

* Note :- level of umbilical skin is supplied by T₁₀ (xiphoid T₇, just above ing. lig. L₁).



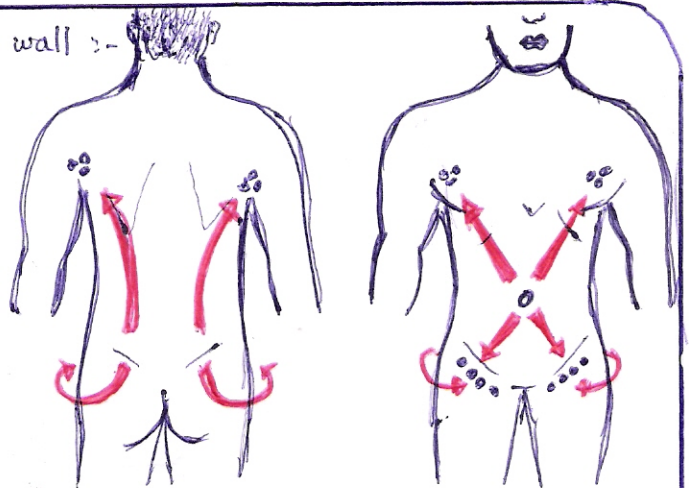
II SUPERFICIAL FASCIA (No deep fascia)

* It's divided into - superficial (outer) fatty layer (Camper's fascia) & - deep (inner) membranous layer (Scarpa's fascia).

* Lymphatic drainage of ant. abd. wall :-

- (A) Superficial lymphatics :-

- above umbilical level it drains into "anterior axillary group of L.N."
- above iliac crest (posteriorly) into "posterior axillary L.N."
- below umbilicus anteriorly and below iliac crest posteriorly drain into horizontal group of superficial inguinal L.N.



- (B) Deep lymphatics :-

- above umbilicus into internal thoracic (mammary L.N.).
- below umbilicus into external iliac L.N., Para-aortic L.N.

① Superficial fatty layer (Camper's fascia):-

- continues with superficial fat over rest of the body
- May be very thick in obese patients.
- In scrotum represented by dartos muscle.

② Deep membranous layer (Scarpa's fascia) ^{superf. fascia of}

- Thin & disappear laterally & above with ↑ back & thorax respectively
- * Inferiorly:- fuse with deep fascia of thigh 1 finger breath below inguinal ligament.
- * In midline inferiorly:- forms tubular sheath for penis (clitoris) [but not attached to pubis].
- * Below in perineum:- enters wall of scrotum (labia majora) [to be attached on each side to pubic arch.].
- * Posteriorly:- fuses with perineal body & perineal membrane.

N.B: In perineum Scarpa's fascia persists as a separate layer called Colles' fascia.

* Venous drainage of ant. abd. wall:-

- above umbilicus into axillary vein by lateral thoracic vein
- below umbilicus into femoral vein by superf. epigastric & great saphenous vein.
- few Paraumbilical veins pass through umbilicus → ligamentum teres to Portal vein (Portosystemic anastomosis).

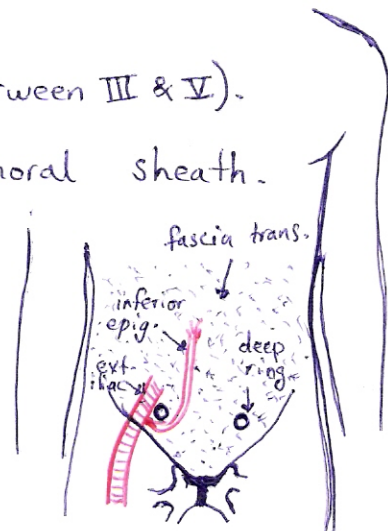
* Arterial supply of ant. abd. wall:-

- Midline :- ① superior epigastric a (internal thoracic),
② inferior epigastric a (external iliac),
③ superficial epigastric a (femoral),
④ lateral thoracic a (axillary).
- Flanks :- ① Post. intercostal arteries (descending thoracic aorta)-
② Lumbar arteries (abd. aorta).
③ deep circumflex iliac a (external iliac).
④ superficial circumflex iliac a (femoral).

III - MUSCLES :- discussed later.

IV FASCIA TRANSVERSALIS:

- It's the forth layers of abd. wall (i.e. between III & V).
- Inferiorly it forms the anterior wall of femoral sheath.
- It has an opening in it's lower part ($\frac{1}{2}$ inch above midinguinal point) called "Deep inguinal ring" just lateral to inferior epigastric artery.



- The deep ring is oval in shape & transmits the spermatic cord (in male) and round lig. of uterus (in female) & gives origin to "internal spermatic fascia."

- Fascia transversalis continuous above with diaphragmatic fascia & below with iliacus fascia & pelvic fascia.

V EXTRAPERITONIAL TISSUE:

- It's the fifth layer [between IV and VI (peritoneum)]
- It's loose connective tissue filled mainly with fat.

MUSCLES OF A.A.W:

- Muscles of ^{anterolateral} abd. wall are 6 muscles each side:-
- 3 are paramedian $\rightarrow$ ① rectus abdominis.
- ② pyramidalis.
- ③ cremasteric.
- 3 are flat ms. $\rightarrow$ ④ External oblique.
- ⑤ Internal oblique.
- ⑥ Transversus abdominus.

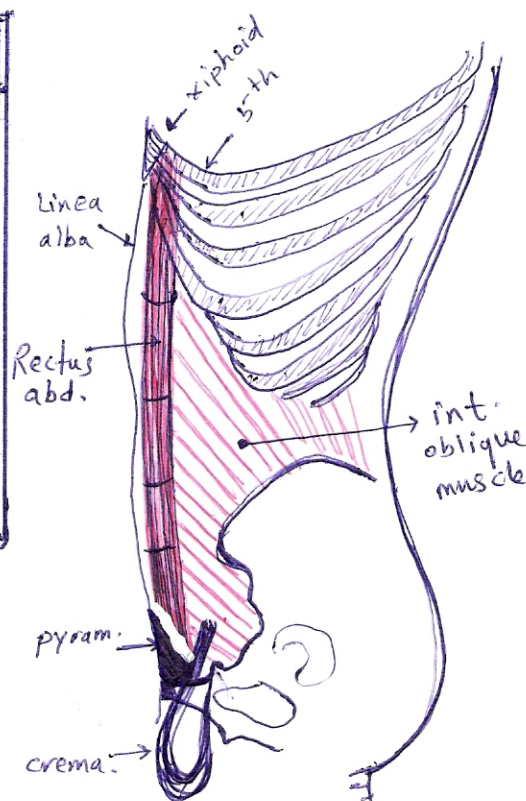
* action of A.A.W muscles:-

- ① support ^{& compress} viscera in place, & ↑ intraabdominal pressure.
- ② protect viscera
- ③ respiration.
- ④ flexion of trunk by rectus abdominis. & assisted by other muscles
- ⑤ suspend testis by cremasteric ms. (cremaster = elevator)
[pyramidalis tenses the linea alba]

* Nerve supply of A.A.W. muscles:-

- Rectus abdominis ————— → by lower 6 thoracic
- Internal oblique ^{external} & transversus abd. → by lower 6 thoracic & L1 nerves
- pyramidalis → by subcostal (T12)
- cremasteric ms. → by "Genital branch" of genitofemoral N.

	origin	insertion.
① Rectus abdominis	• pubic crest • symphysis pubis	• 5 th , 6 th & 7 th costal cartilage • xiphoid process.
② pyramidalis ↳ may be absent	pubic crest	linea alba (lower part)
③ Cremasteric	internal oblique muscle fibers	pubic tubercle (after forming loop around testis)



* Note:- rectus ms. is divided into segments by tendinous intersection and involved in rectus sheath. (usually 3 intersections)

- ↳ at xiphoid
- ↳ at umbilicus
- ↳ halfway between these two

*** RECTUS SHEATH

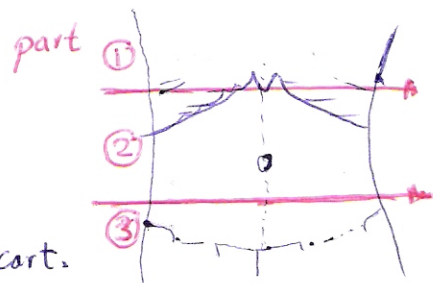
* Definition -

- It's the aponeuritic sheath that enveloping rectus abd. ms.

* Parts :-

① First part :- above costal margin.

- formed - anteriorly by ext. obl. apon.
- posteriorly by 5th, 6th, 7th cost. cart.

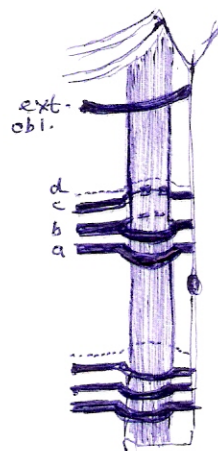


② Second part :- from costal margin to a line midway between umbilicus & symph. pubis. (at ASIS level)

- formed - anteriorly by ext. obliq. + anterior lamella.
- posteriorly by transv. abd. + posterior lamella.

③ Third part :- from previous line to symph. pubis below.

- formed - anteriorly by 3 ms aponeuroses (ext., int., trans)
- posteriorly by fascia transversalis



- arcuate line is the lowermost line of post. wall of rectus sheath.
- at this level inf. epigastric vessels enter rectus sheath.

N.B:- internal oblique in the second part is

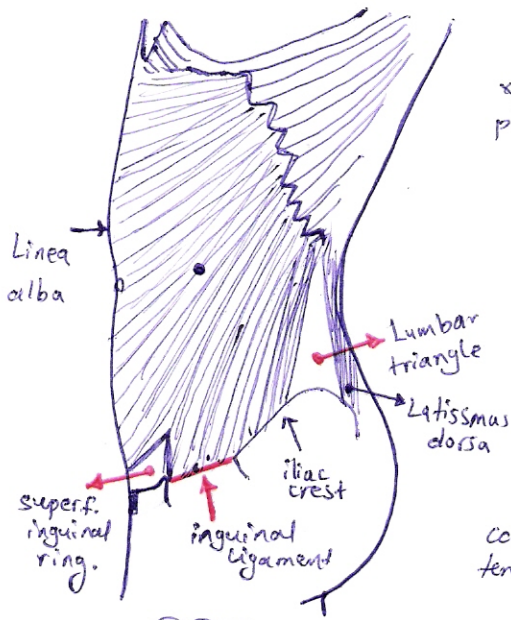
divided into ant. lamella (in front rectus) and post. lamella (behind the rectus).

- linea semilunaris is the lateral margin of rectus abdominis.

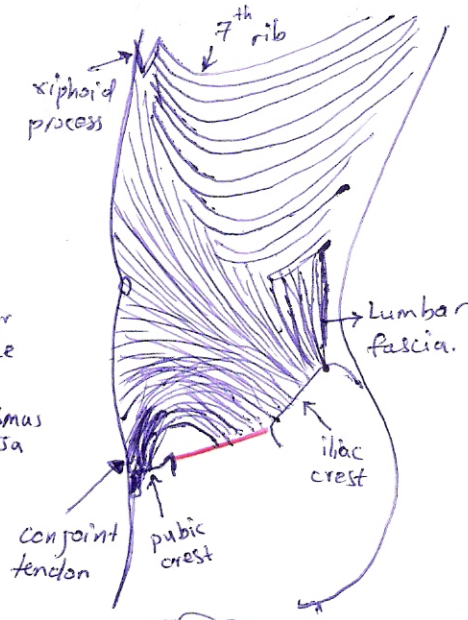
- linea alba: fibrous band from xiphoid to symph. pubis, formed by fusion of aponeuroses of 3 muscles from 2 sides.

* Contents of R. sh

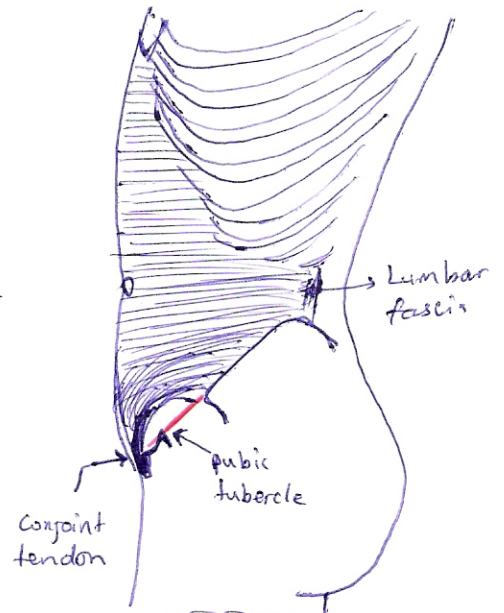
- 2 muscles → rectus abd. & pyramidalis.
- 2 vessels → superior & inferior epigastric vessels.
- 2 nerves → lower 5 intercostal & subcostal nerves.
- Lymphatics, vessels.



EXTERNAL
OBLIQUE
OUTER

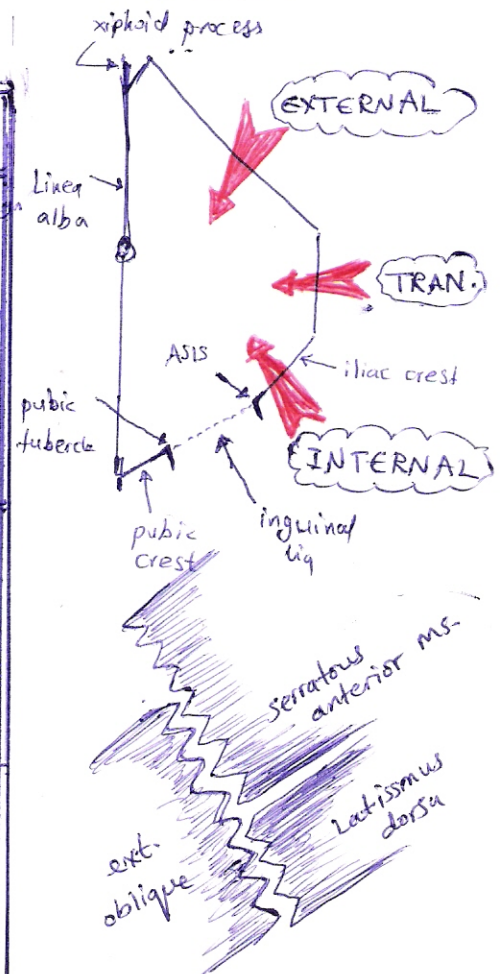


INTERNAL
OBLIQUE
MIDDLE



TRANSVERSE
ABD.
INNER

	4	5	6
	EXTERNAL OBLIQUE	INTERNAL OBLIQUE	TRANSVERSE ABD.
origin	lower 8 ribs (by 8 digitis which interdigitate with 4 digits of latiss. dorsi & lower 4 of serratus ant.)	- Lumbar fascia. - iliac crest (2/3) - inguinal lig. (lat. 2/3)	- interdigitate with diaphragm - lower 6 ribs. - Lumbar fascia - ant. - iliac crest (2/3) - ing. lig. (lat. 1/3)
insertion	xiphoid, linea alba, pubic crest & tubercle, ASIS & iliac crest (ant. 1/2)	lower 6 ribs, xiphoid, linea alba, pubic crest & pectineal line.	xiphoid, Linea alba, pubic crest & pectineal line.
special character	- superficial ing. ring. - inguinal lig. - Lumbar Δ	conjoint tendon	conjoint tendon
Direction of fibers	Downward forward & medially	upward, forward, medially	horizontally forward



ASIS = ant. sup. iliac spine.

*** (SUPERFICIAL ING. RING) :-

- It's a triangular opening in the aponeurosis of external oblique muscle just above & ^{Medial} ~~lateral~~ to pubic tubercle.
- It gives origin to "external spermatic fascia" around spermatic cord & testis. "margins of the ring called crura"



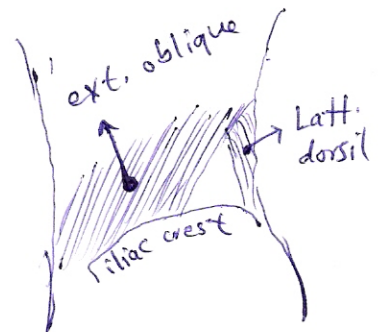
- It gives passage to ① ilioinguinal nerve.

② spermatic cord (in male) or round lig. of uterus (female).

- It may be the site for "indirect inguinal hernia"

* (LUMBAR TRIANGLE) :-

- Boundaries :-
 - anteriorly :- external oblique (post. border)
 - posteriorly :- Latissimus dorsi - (lat. border)
 - inferiorly :- iliac crest (middle part).
- It may be site for "Lumbar hernia"



* (INGUINAL LIGAMENT) :- (poupart's lig.) :-

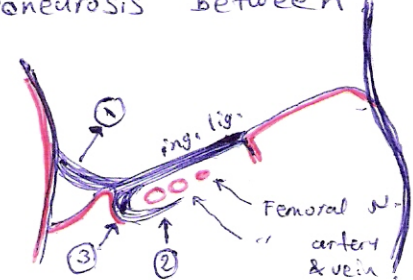
- It's the lower rolled border of ext. oblique aponeurosis between pubic tubercle (medially) & ASIS (Laterally)
↳ ant. sup. iliac spine.

- It's lower surface is convex to the thigh due to attachment into fascia lata of thigh.

- Extension :- ① reflected ligament → upward medially to linea alba.

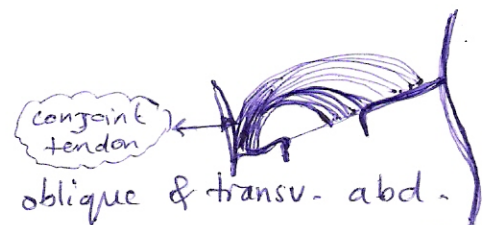
② pectineal lig. → (Cooper's lig.) → laterally.

③ Lacunar lig → triangular, it's the start of pectineal lig.



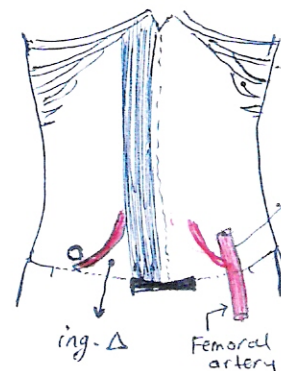
* (CONJOINT TENDON) :-

It's the lower most fibers of internal oblique & transv. abd. which arch to be attached to (pubic crest & pectineal line) inferiorly, (linea alba) medially & free laterally



* (INGUINAL TRIANGLE) (Hasselbach's Δ)

- Bounded ① medially :- by rectus abd. (Lat. border).
- ② superolaterally: by inf. epigastric artery.
- ③ inferiorly : by ing. lig. (medial $\frac{1}{2}$).
- It may be the site of "Direct inguinal hernia"



* (INGUINAL CANAL)

- It's ^{oblique intramuscular} passage between the deep & superficial inguinal rings.
- It's about one & $\frac{1}{2}$ inches (4 cm). ^(1.5) directed downward & medially - parallel & above to inguinal ligament
- * Boundaries :- 2 ant. :- external oblique & internal oblique (Lat. $\frac{1}{3}$).
- 2 post. :- fascia transv. & conjoint tendon (+reflected lig.)
- 2 above :- internal oblique & transv. abd. ^(medial $\frac{1}{3}$) ^(medial $\frac{1}{4}$)
- 2 below :- inguinal lig. & Lacunar lig. ^(floor) ^(medial end)

* Contents (passing through it) :-

- 2 in male $\rightarrow$ ilioinguinal nerve & spermatic cord.
- 2 in female $\rightarrow$ ilioinguinal nerve & round lig. of uterus.
- N.B:- in newborn deep ring lies almost directly posterior to superf. ring.

* (SPERMATIC CORD)

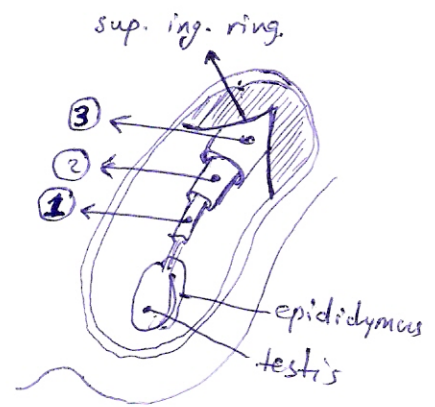
- It's a cord that contains vas deferens & N, A, lymph of testes from deep ing. ring to back of testes (structures are from abd.)

- Contents :-

- | | |
|--|---------------------------------|
| ① vestige of processus vaginalis (embryo) | ⑥ Lymphatic of testes. |
| ② vas deferens - (45 cm) | ⑦ sympathetic N. of testes. |
| ③ artery to vas deferens (inf. vesical) | ⑧ testicular artery. |
| ④ artery to cremasteric. (inf. epigastric) | ⑨ pampiniform plexus of veins - |
| ⑤ Nerve ~ " - (genital br. of genitofemoral nerve) | |

Covering of spermatic cord

- ① internal spermatic fascia (from fascia transv.)
- ② Cremasteric muscle & fascia (from int. oblique).
- ③ External spermatic fascia (from external oblique).

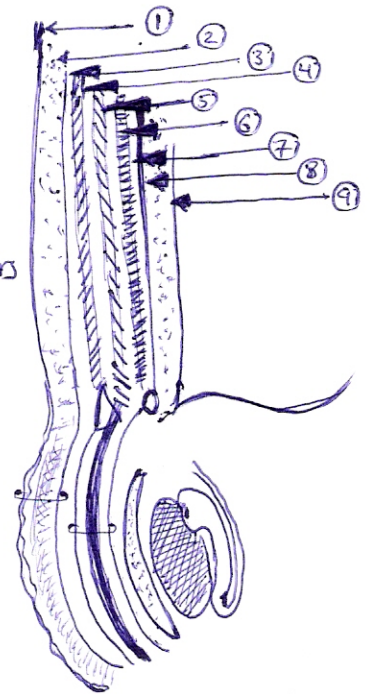


LAYERS OF SCROTUM

-(COVERING OF TESTES):-

- As the testes descend from abdomen to scrotum it takes covering from ant. abd. wall layers
- the covering of testes are

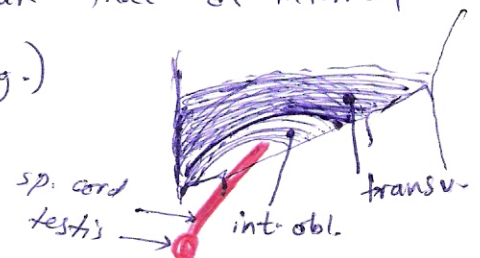
- a) skin → ①
 - b) dartos ms (instead of sup. fatty layer) ②
 - c) membranous layer of sup. fascia (from ③)
 → Colles fascia
 - d) ext. spermatic fascia (from ext. obl.) ④
 - e) cremasteric ms & fascia (from int. obl.) ⑤
 - f) int. spermatic fascia (from fascia trans.) ⑦
 - g) parietal layer of tunica vaginalis
 - h) visceral ~ ~ ~ ~ ~
 - i) Tunica albuginea (testis capsule).
- } covering of sp. cord.
- } from peritoneum ⑨



^{Age} NB:- Lymph drainage of scrotum to superficial inguinal LN while testis to Paraortic LN

N.B.:- transversus abdominus muscle ⑥ is not involved in covering of testis bec. its arch is higher than that of internal oblique (as it take only 1/3 of ing. lig.)

N.B.:- dartos ms innervated by sympathetic nerves & causing skin wrinkling of scrotum.

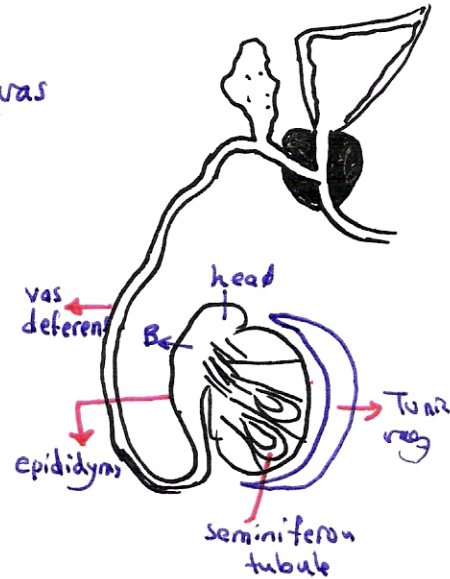


TESTIS :-

- Firm, mobile organ ; lies within the scrotum.
- Surrounded by strong fibrous capsule (Tunica albuginea).
- Left testis usually at lower level than right testis.
- Testis consists of lobules (by fibrous septa) that contain coiled seminiferous tubules which open into rete testis (network of channels) that open into epididymis

EPIDIDYMIS

- Firm structure, lies posterior to testis with vas deferens medial to it.
- Formed of head, body & tail inferiorly.
- Inside it there is coiled tube 20 feet (6 meter) long embedded in connective tissue then emerges from tail as vas deferens.
- * Sinus of epididymis: is a distinct groove between testis & epididymis on lateral side lined with visceral layer of tunica vaginalis.



* Function of epididymis :

- 1 - storage of sperms & allows them to mature.
- 2 - absorption of fluid.
- 3 - secretion of substances to seminal fluid to nourish sperm

* Blood supply of testis & epid. :-

- Testicular artery (abd. aorta) & drain by Pampiniform plexus of veins to form testicular vein at deep ing. ring then end into IVC (right) & left renal vein (left).

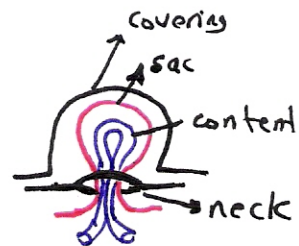
* Lymph drainage :-

- Para aortic LN at L₁ level (transpyloric).

ABDOMINAL HERNIA

* **Hernia**:- protrusion of part of abdominal contents through weakness in abdominal wall.

- Consists of ①-sac ②-neck (defect) ③-contents ④-covering



* **Types**:-

- 1- Inguinal hernia (direct & indirect).
- 2- Femoral hernia
- 3- Umbilical hernia (congenital or acquired).
- 4- Epigastric hernia
- 5- Separation of recti abdominis.
- 6- incisional hernia (through scar or by cutting nerve).
- 7- Spigelian hernia (hernia of semilunaris).
- 8- Lumbar hernia (Petit's triangle hernia).
- 9- Internal hernia (into peritoneal fossa, epiploic foramen,etc)

* **Indirect inguinal hernia**:-

- congenital hernia (remnant of processus vaginalis).
- more common than direct ing. hernia, more in male, more on the right side, affect children & young adults
- hernial sac enters inguinal canal through deep ing. ring & may extend through superficial ing. ring to scrotum (labium majus)
- neck of hernia is narrow.

* **Direct inguinal hernia**:-

15% of all ing. hernias

- more common in old male (weak abdomen), neck is wide
- sac bulges forward through inguinal (Chasselbach) triangle

* Femoral hernia :-

- More common in female
- sac bulges through femoral ring (neck) then femoral canal
- neck lies below & lateral to pubic tubercle.

* Umbilical hernia :-

- Congenital umbilical hernia, (exomphalos) (omphalocele): caused by failure of midgut to return to abdominal cavity.
- Acquired umbilical hernia: small hernia, in children caused by weakness in scar of umbilicus in linea alba.
- usually disappear spontaneously.
- Adult acquired umbilical hernia: (Paraumbilical hernia) :- sac protrude through linea alba around umbilicus.
- more common in female.

* Epigastric hernia :-

- common in middle aged, ^{more} in porters (manual worker).
- sac protrude through widest part of linea alba between xiphoid & umbilicus.

* Separation (divercation) of recti :-

- more in multipara women with weak abdomen.

د/فالح عبدالرحمن

POSTERIOR ABDOMINAL WALL

(PAW)

* The subjects which will be discussed in this chapter are:

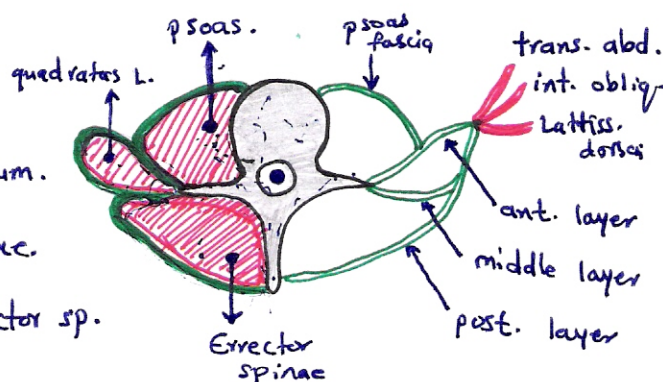
- I. Lumbar fascia.
- II. Muscles of P.A.W.
- III. Nerves of P.A.W. (Lumbar plexus).
- IV. Vessels at P.A.W. (aorta & inf. vena cava).

I. LUMBAR FASCIA: [Thoracolumbar fascia]

- It's strong sheet of deep fascia enclosing the muscles of back.
- It's attached to neck above & sacrum below (but well developed in the lumbar region)

- It's divided into 3 layers:

- ① anterior layer: in front quad. lumborum.
- ② Posterior " : behind erector spinae.
- ③ Middle " : bet quadratus L. & erector sp.



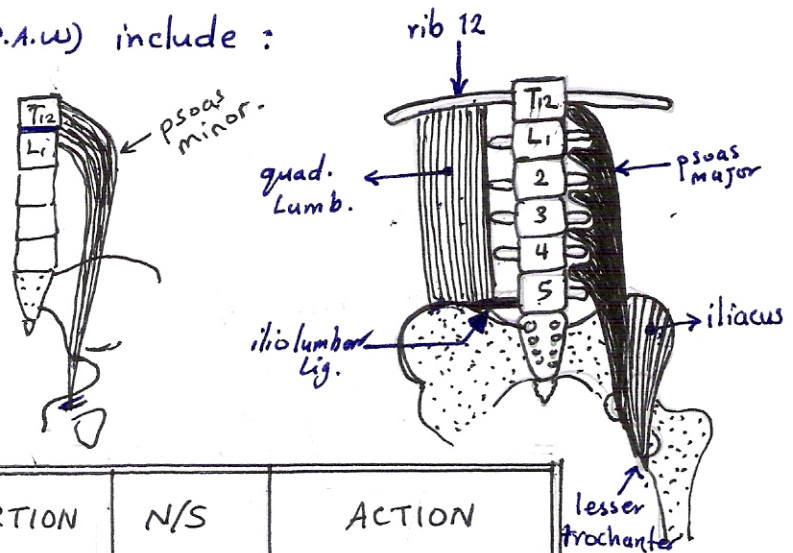
N.B: the fascia anterior to psoas muscle called psoas fascia which extended below iliac crest to cover the iliacus also → called fascia iliaca.

N.B: fascia iliaca forms post. layer of femoral sheath while fascia transversalis forms ant. layer.

I MUSCLES OF P.A.W.

* Muscles of post. abd. wall (P.A.W) include :

- ① Psoas major.
- ② Psoas minor.
- ③ Quadratus lumborum.
- ④ Iliacus. (lies in false pelvis)



	ORIGIN	INSERTION	N/S	ACTION
Quad. lumborum	• iliac crest • iliolumbar lig.	• Last rib • transv. process of 1st 4 Lumbar.	• T12 • L1, 2, 3, 4	- Lateral flexion of vertebral column. - extension of the column when acting 2 muscles - Fix rib 12 at respiration
Iliacus	• iliac fossa	lesser trochanter	Femoral N.	flexion of hip (as psoas major)
Psoas major	• by 10 slips - 5 from transv. process of the lumbar vertebrae & - 5 from bodies & discs. - also T12 vertebra	• lesser trochanter (with iliacus) [ileopsoas tendon]	L1, 2, 3 "first 3 lumbar" "lumbar plexus" L2, 3, 4	& med. rotation - flexion of thigh & Lateral flexion of v. column - Flexion of trunk → if thigh fixed
Psoas minor ↳ absent in 40% of people	from bodies of T12 & L1 & intervert. disc.	• pectineal line (= iliopectineal line) (= iliopubic)	L1	weak flexor of v. column.

* Psoas fascia (sheath) is thickened above to form medial arcuate lig.

* Applied anatomy: psoas abscess.

* Lumbar fascia lies in front quad. Lumborum, thick above → lat. arcuate lig. and below to form iliolumbar ligament.

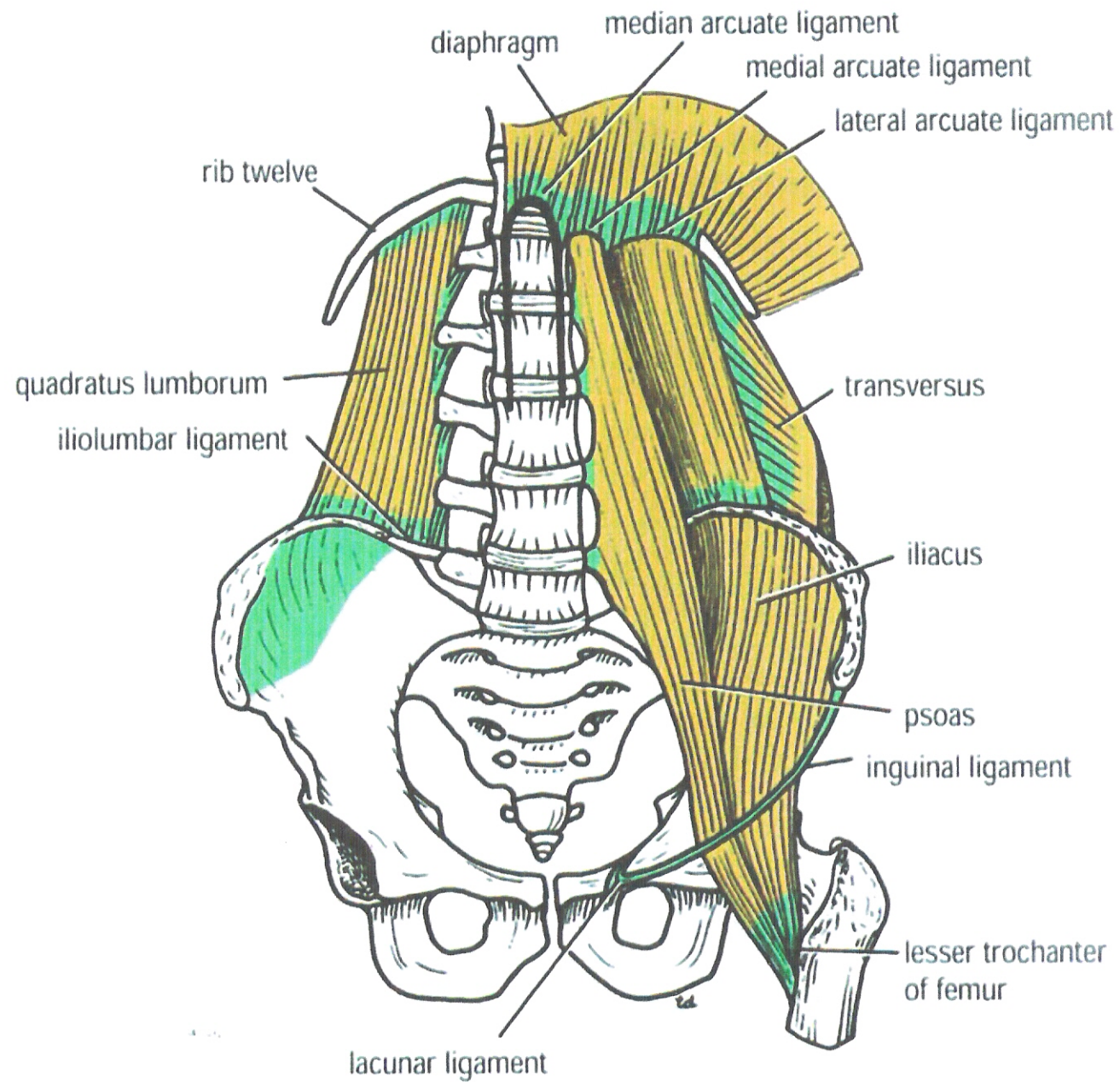


Figure 4-33 Muscles and bones forming the posterior abdominal wall.

III - NERVES OF P.A.W. "Lumbar plexus"

* The lumbar plexus is formed within the substance of psoas major ms. by the 1st 4 Lumbar nerves (ventral rami).

* Branches of lumbar plexus:

① Iliohypogastric N. (L₁). → supply skin of AAW (Ant. abd. wall)

② Ilioinguinal N. (L₁). → supply skin of groin & scrotum or labium majus

③ Genito femoral N. (L_{1,2}). → Genital br. supply cremasteric ms.
femoral br. to skin of upper thigh

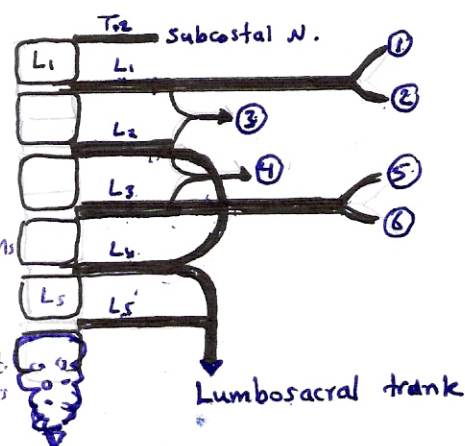
④ Lateral cut. N. of thigh. (L_{2,3}). → to skin of lat. side of thigh, enters behind ing. lig.

⑤ Femoral N. (L_{2,3,4}).

⑥ Obturator N. (L_{2,3,4}).

⑦ * Lumbosacral trunk is formed by lower part of L₄ (ventral ramus) and L₅ (ventral ramus).

⑧ Muscular branches.



* RELATION OF PSOAS MAJOR MS :

① Posterior: - trans. lumbar processes.

- Lumbar plexus.

② Anterior: - ureter, renal pelvis, kidney.

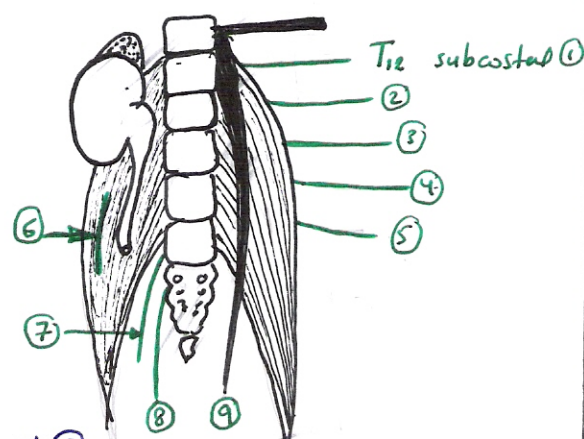
= Genito femoral N.

= psoas minor.

③ Medial: * obturator N. ⑦ & Lumbosacral trunk ⑧

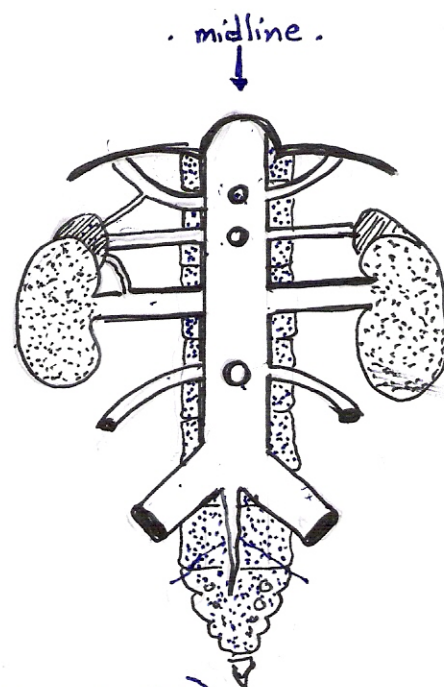
④ Lateral: = subcostal ①, iliohypogastric ②, ilioinguinal ③,

Lat. cut. N. of thigh ④ and femoral N. ⑤



(ABDOMINAL AORTA)

- starts at T_{12} (continuation of descending thoracic aorta)
- ends at level of L_4 by giving 2 terminal branches (common iliac).
- pass in front of 1st 4 Lumbar bodies slightly to the left.



* BRANCHES

- A. paired branches:
- ① inferior phrenic a. (at upper part of L_1)
 - ② middle suprarenal a. (at lower " " L_1).
 - ③ renal arteries (at level of L_2).
 - ④ Gonadal " (" " " L_3).
 - ⑤ Common iliac a. (" " " L_4).
- Lumbar arteries (4 pairs)

- B. single branches:
- ⑥ Coeliac trunk (at upper part of L_1).
 - ⑦ superior mesenteric (at lower " " L_1).
 - ⑧ inferior " (at level of L_3).
 - ⑨ median sacral a. (" " " L_4).

[NB] The abdominal aorta gives off 4 lumbar arteries at the level of each one of 1st 4 vertebrae.

[NB] superior suprarenal artery is a branch of inf. phrenic a & inferior " " " " renal artery

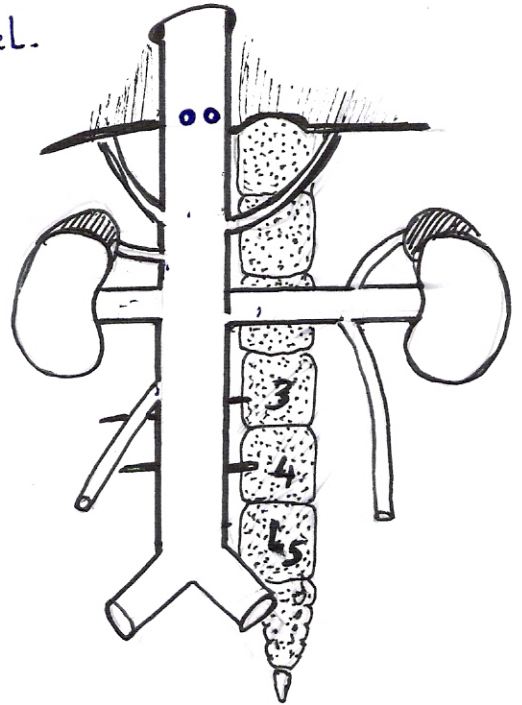
- Relation of abd. aorta
 - (Rt side): IVC, cisterna chyli & azygos vein
 - (Lt side): left symp. trunk (Rt trunk behind IVC)
 - (posterior): bodies of lumbar vertebrae.

INF. VENA CAVA:

- Starts at L₅ by union of 2 common iliac veins. (behind Rt common iliac a.)
- ends by entering thorax at T₈ level.

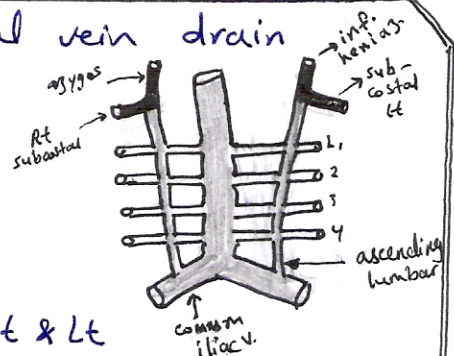
TRIBUTARIES:

- ① Rt & Lt inf. phrenic veins.
- ② Rt suprarenal vein.
- ③ Rt & Lt renal veins.
- ④ Rt gonadal vein.
- ⑤ Rt & Lt common iliac veins.
- ⑥ Lumbar veins.
- ⑦ 2 hepatic veins.



NB:- Lt suprarenal vein & Lt gonadal vein drain into Lt renal vein.

N.B:- Lumbar veins connected together by ascending lumbar vein which unite with the Rt & Lt subcostal to form azygos & inf. hemiazygos respectively.



LYMPH. DRAIN OF POST. A.W.

- ① Pre-aortic LN (coeliac, sup. & inf. mesenteric LN):
 - receive from GIT (from ^{lower} esoph. to upper 1/2 anal canal), spleen, pancreas, liver
 - efferent form intestinal lymph trunk.
 - ② Para-aortic LN (lumbar LN) (lateral Rt & Lt aortic LN):
 - receive from kidney, suprarenal, gonads, common iliac nodes, uterus, wall (fundus) abd.
 - efferent forms Rt & Lt lumbar lymph trunk.
- Thoracic duct formed in abdomen from cisterna chyli front L₁₋₂ receive intestinal, Rt & Lt lumbar lymph trunks. (& some ^{lower} thoracic lymph)

ABDOMINAL PLANES

① Intertubercular plane: (Transtubercular):

- at the level of L₅ body. [between tubercles of iliac crest]
- Site of formation of inf. vena. cava.

② Supracristal plane: (intercristal)

- at level of L₄ body. [between highest points of iliac crest].
- Site of bifurcation of abd. aorta.

③ Umbilical plane:

- at level of disc between L₃ & L₄.
- site of umbilicus.

④ Subcostal plane:

- at level of L₃ body [bet. lowermost points of costal margin].
- site of - origin of gonadal & inf. mesenteric arteries 10th costal cart.
- Third part of duodenum.

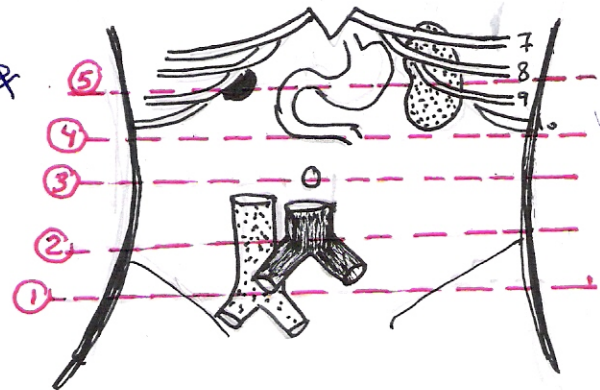
⑤ Transpyloric plane:

- at level of L₁ body [bet. tips of Rt & Lt 9th costal cartilages]
- site of - pylorus of stomach
 - fundus of gall bladder. &
 - hilum of Lt kidney.
 - neck of pancreas

⑥ Lateral vertical plane:

- at level of mid clavicular points
also midinguinal point.

(Midpoint between ASIS & symph. pubis)

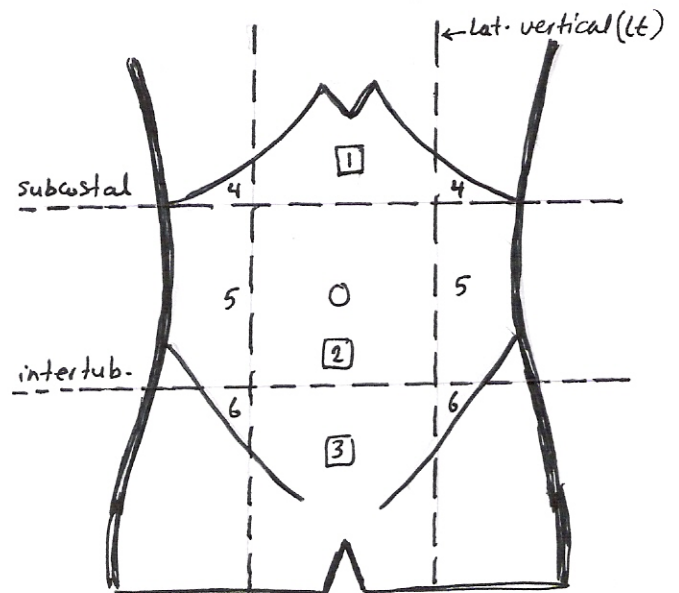


SUBDIVISIONS OF ABD. CAVITY:

- The abdominal cavity is divided into 9 regions by 2 transverse & 2 longitudinal planes
- The 2 longitudinal are $\rightarrow$ Rt & Lt vertical planes.
- The 2 transverse are $\rightarrow$ Subcostal & intertubercular planes

* The nine regions are:-

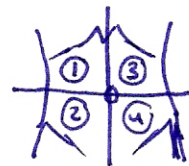
- ① epigastrium.
- ② umbilical.
- ③ hypogastrium.
- ④ Rt & Lt hypochondrium.
- ⑤ Rt & Lt Lumbar.
- ⑥ Rt & Lt iliac fossae.



* The abdominal quadrants:-

(using vertical & horizontal line through the umbilicus)

- | | |
|---------------|--------------|
| ① upper right | ③ upper left |
| ② lower right | ④ lower left |



* Epigastrium = area below xiphoid process & above umbilicus.

* Periumbilical = area around umbilicus.

ABDOMEN NOTES

Part 2

"Abdominal"
Cavity



PERITONEUM

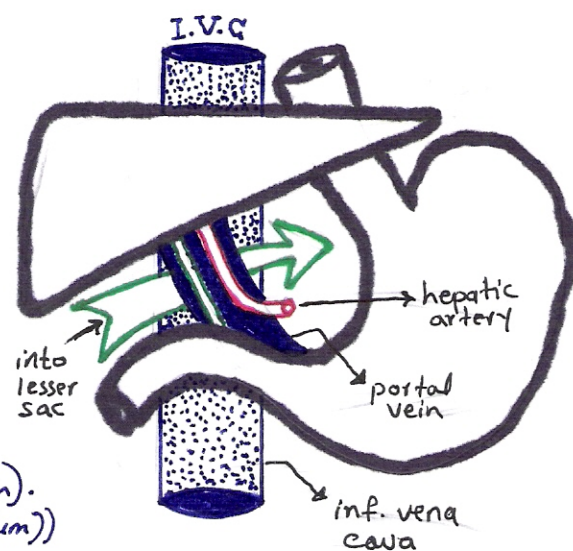
- It's a large serous sac that covers the abdominal viscera & lines the abd. wall.
- It's divided into parietal (lines abd. wall) and visceral (that covers abd. viscera).
- Between the parietal & visceral peritoneum there's a cavity called peritoneal cavity containing serous fluid.
- The peritoneal cavity is closed sac in "MALE" and opened sac in "FEMALE" by uterine tube.
- The perit. cavity is divided into lesser & greater sacs, between lesser & greater sacs there is an opening called opening into lesser sac "EPIPLOIC FORAMEN"

EPIPLOIC FORAMEN

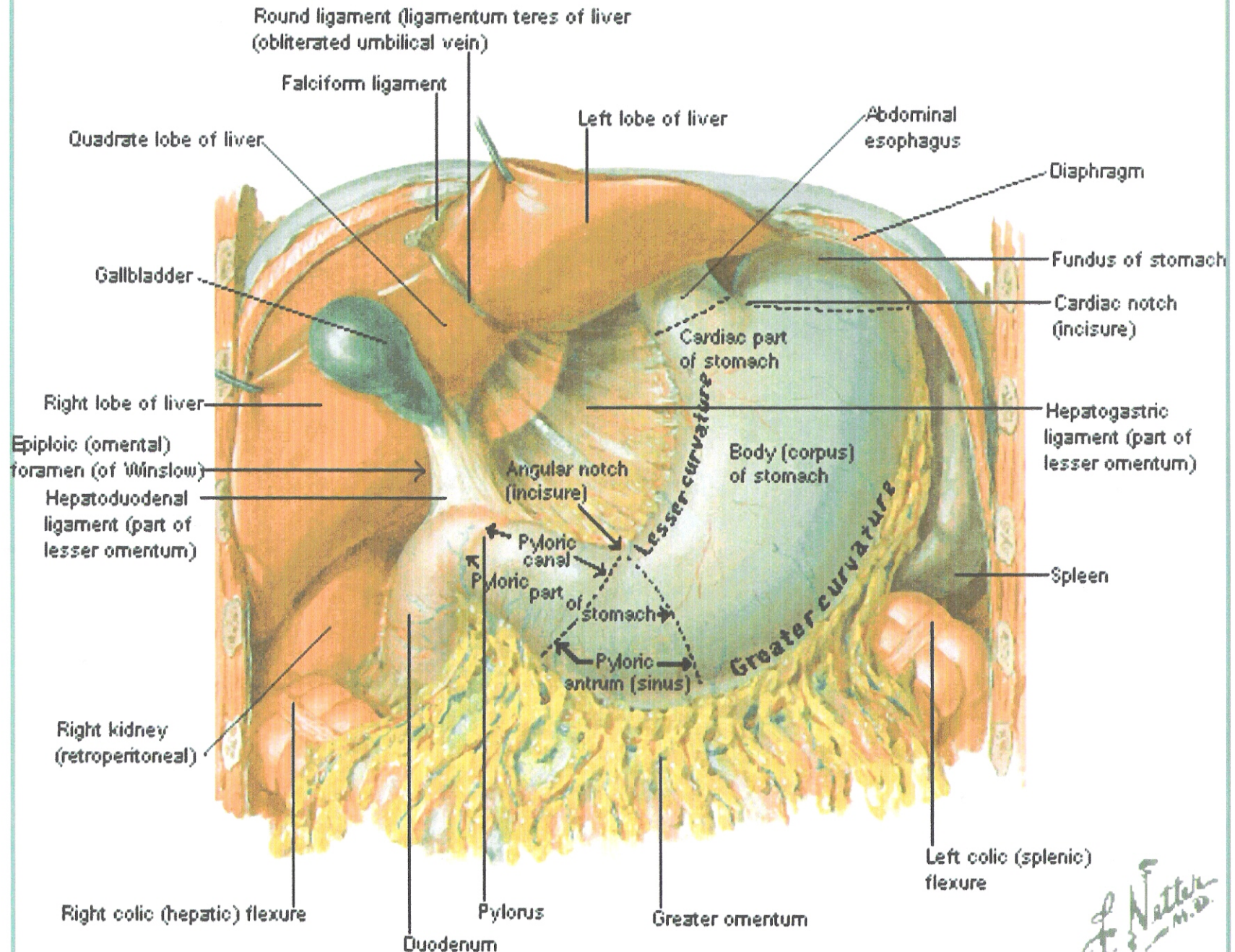
- It's a connection between the lesser & greater sac of perit. cavity.

BOUNDARIES:

- Anterior: ① portal vein, ② hepatic artery
(ant to the left of portal vein) &
③ bile duct (ant. to Rt of portal vein).
(in the free border of lesser omentum)
- Posterior: Inf. vena cava.
- Superior: Liver (caudate process of caudate lobe of liver).
- Inferior: Duodenum (1st inch of 1st part of duodenum).



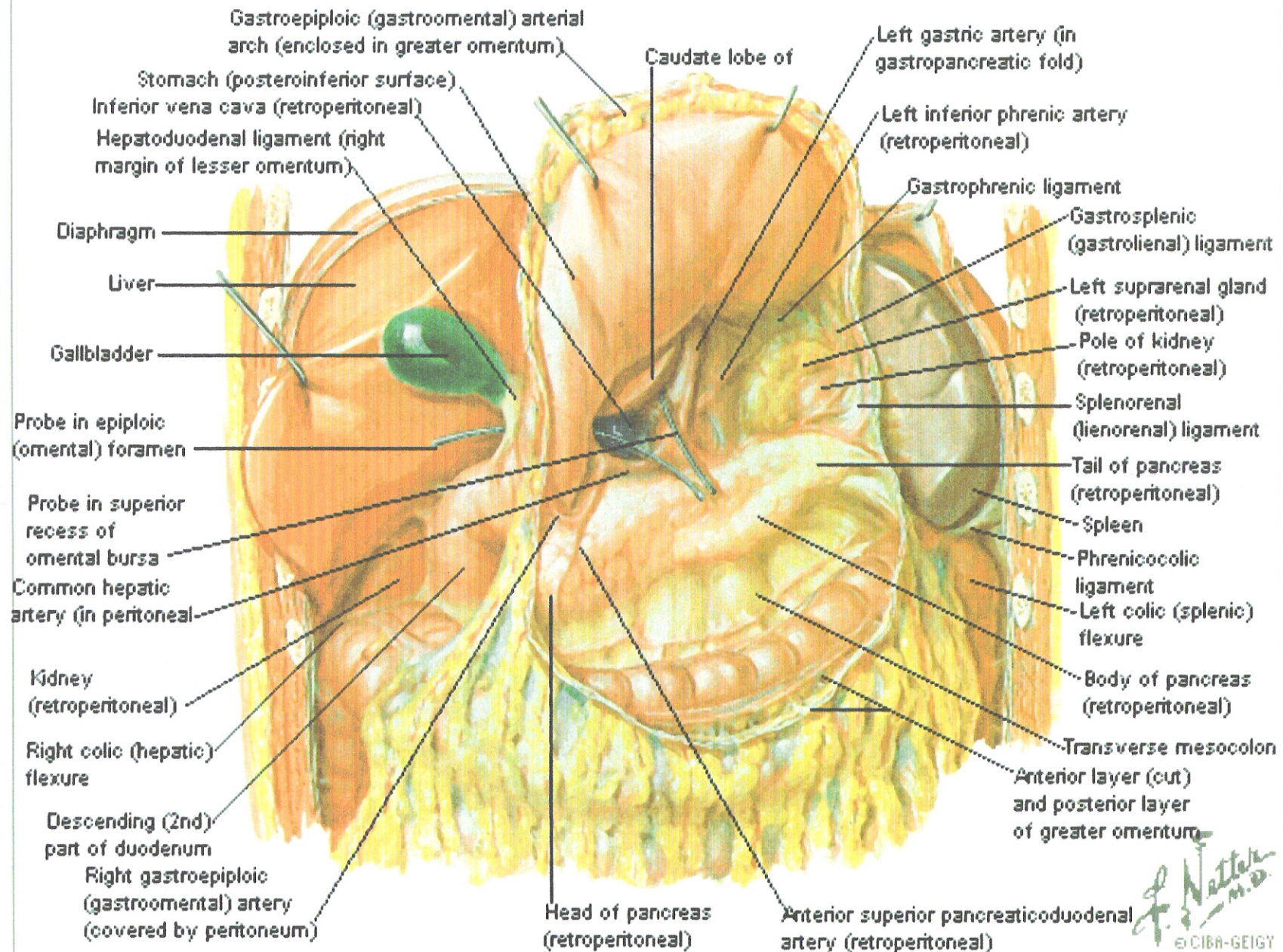
Stomach in Situ



F. Netter M.D.
© CIBA-GEIGY

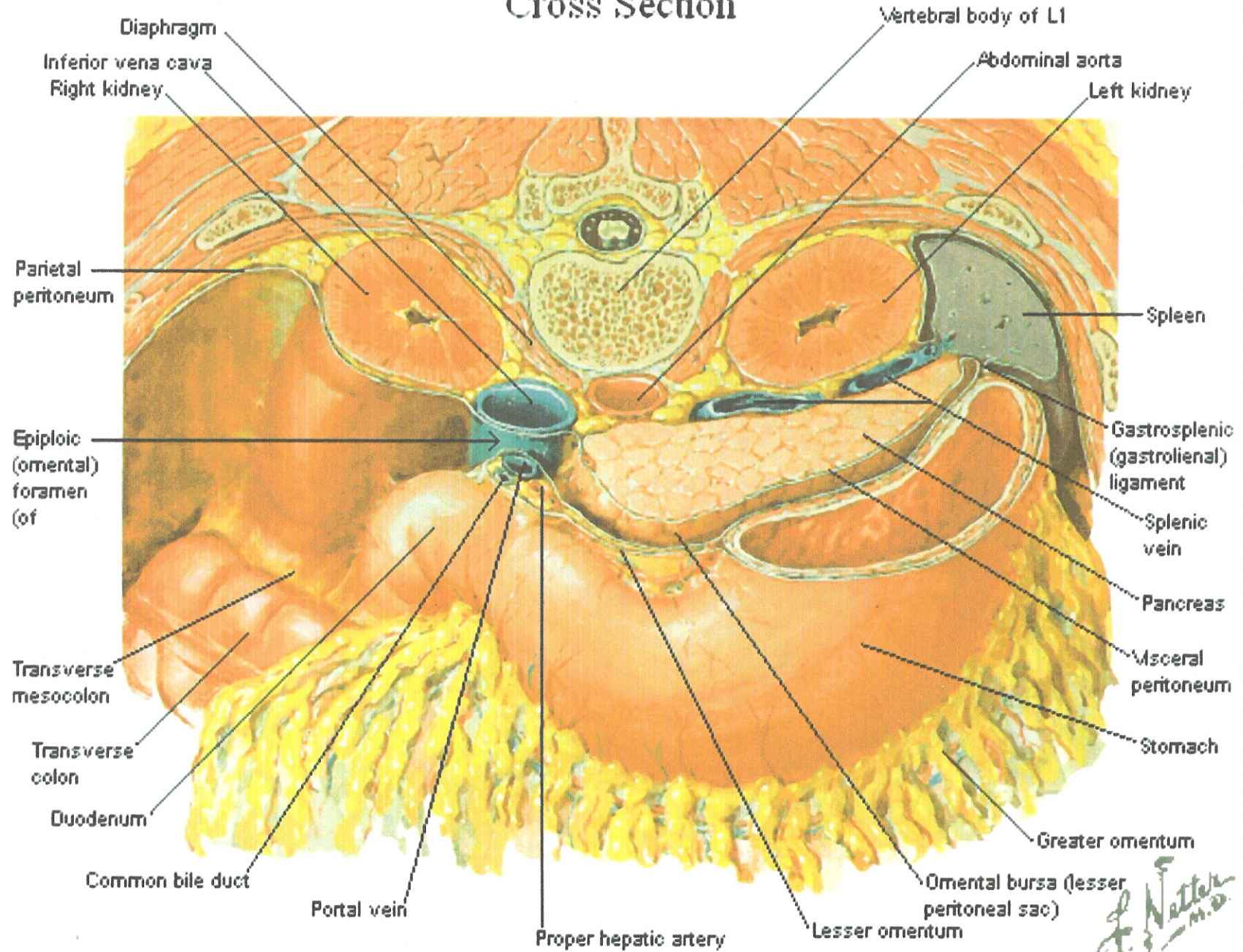
Omental Bursa

Stomach Reflected



Omental Bursa

Cross Section



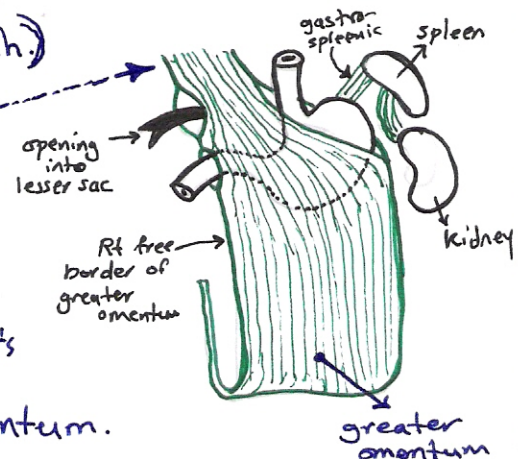
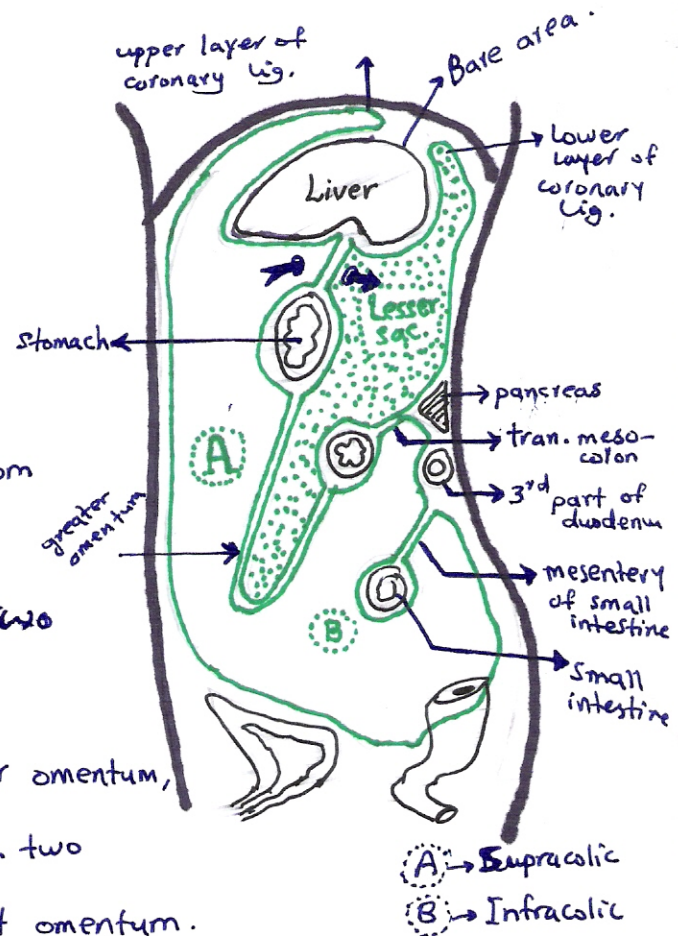
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LESSER SAC

- Large peritoneal recess behind the stomach.

BOUNDARIES

- Above: reflection of peritoneum from liver to diaphragm.
- below: meeting of ant. & posterior two layers of greater omentum.
- Anterior: Caudate lobe of liver, Lesser omentum, back of stomach and ant. two layers of ~~peritoneum~~ great omentum.
- Posterior: post. 2 layers of greater omentum, transverse colon, trans. mesocolon, peritoneum covering stomach bed (structures of post. abd. wall behind stomach.)
- Rt. border: - peritoneum of caudate lobe of liver
- epiploic foramen, Rt free border of greater omentum.
- Lt border: ^{spleen} gastro-splenic & Lienorenal ligaments and Lt free border of greater omentum.



GREATER SAC

classified into:

- Supracolic part (A): superior & anterior, classified into Rt & Lt by the falciform ligament.
- Infracolic part (B): inferior & posterior, classified into Rt & Lt by the mesentery of small intestine.

FOLDS OF PERITONEUM

- They are double layers of peritoneum connecting abd. organs to each others or to **the** abd. wall.

CLASSIFICATION:

① Omentum:- folds connecting stomach to other organs.

- Include: lesser omentum, Greater omentum & gastro-splenic omentum (or lig.).

② Mesentery:- folds connecting intestine to post. abd. wall.

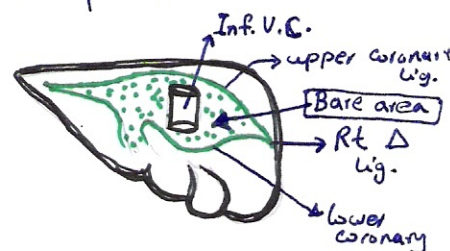
- include:- mesentery of small intestine.

- mesoappendex.

- mesocolon (trans. & sigmoid mesocolon).

③ Ligaments:- The rest of folds.

- include :- coronary lig., triangular lig., falciform lig., gastrosplenic, gastrophrenic, colicophrenic and lienorenal ligaments.



① Lesser omentum:

- fold of peritoneum between liver above & lesser curvature of stomach below.

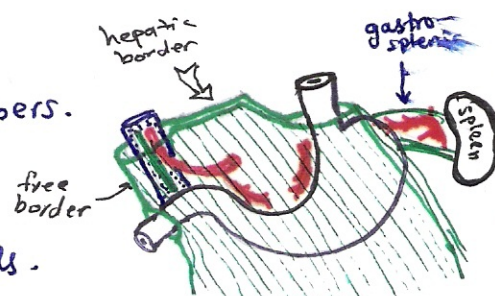
■ Contents :- 1- extraperitoneal fat.

2- sympathetic & parasympathetic fibers.

3- lymphatics

4- vessels :- Rt & Lt gastric vessels.

5- portal vein, hepatic artery & bile duct (in free margin)



② Greater omentum:-

= fold of peritoneum between greater curvature of stomach & transverse colon. [[It can be named POLICE man of abdome]]

= Contents: ① Extraperitoneal fat.

② sympathetic & parasymp.

③ Lymphatics (Rt gastroepiploic L.N.).

④ vessels (Rt & Lt gastroepiploic vessels).

③ Gastrosplenic omentum (or lig):-

= fold of peritoneum bet. spleen^{hilum} with upper part of greater omentum.

= Contents:- ① Extraperitoneal fat.

② symp. & parasymp.

③ Lymphatics (pancreaticosplenic L.N.).

④ vessels (short gastric vessels).

④ Lienorenal Lig:-

= fold of peritoneum bet. spleen^{hilum} & Lt kidney.

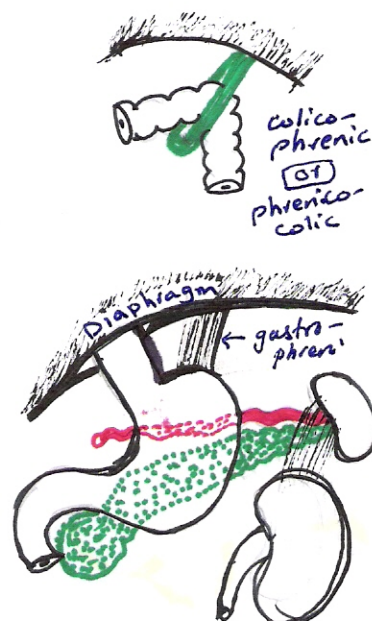
= Contents:- ① Extraperitoneal fat.

② symp. & parasymp.

③ Lymphatics (pancr. splenic L.N.).

④ vessels (splenic vessels).

⑤ Tail of pancreas.



N.B. Colicophrenic lig. :- bet. diaphragm & Lt colic flexure.

gastrosplenic lig. :- " " & stomach. (post surface upper part)

(5) Mesoappendix:

- = fold of peritoneum enclosing appendix. (Δ in shape).
- = Contents :- ① Extraperit. fat.
- ② symp. & parasymp.
- ③ vessels (appendicular vessel).
- ④ Lymphatics.
- ⑤ appendix (vermiform appendix).

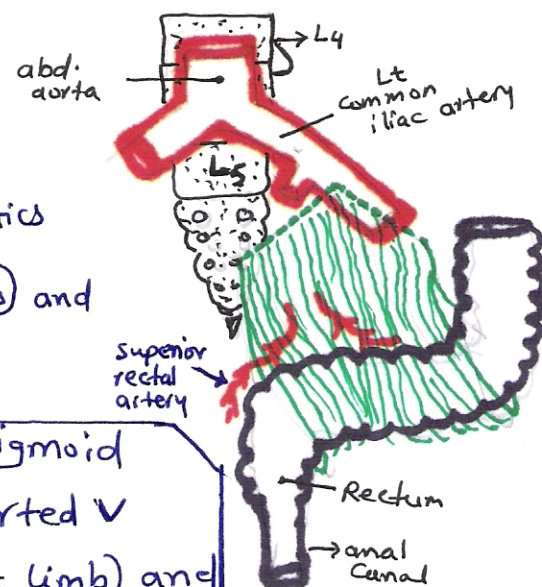
(6) Transverse mesocolon:

- = fold of perit. between trans. colon & pancreas. (ant. border & head).
- = Contents:- ① Extraperit. fat.
- ② symp. & parasymp.
- ③ Lymphatics.
- ④ vessels (middle colic vessels).
- ⑤ Transverse colon.

(7) Sigmoid mesocolon:

- = fold of perit. enclosing sigmoid colon
- = Contents: ① fat. ② sym. & parasymp. ③ Lymphatics
- ④ vessels (sigmoidal & sup. rectal vessels) and
- ⑤ Sigmoid colon

[NB] It has free border enclosing the sigmoid and root: which is shaped as inverted V attached to left ext. iliac artery (Lt limb) and to sacrum until 3rd piece (by Rt limb).



⑧ Mesentery of small intestine.

= fold of peritoneum, fan shaped, has free border (enclosing jejunum & ileum) and attached border (root) on post. abd. wall.

= Contents: ① Extraperit. fat.

② symp. & parasymp.

③ lymphatics.

④ superior mesenteric vessels.

⑤ jejunum & ileum.

= [NB] free border is 20 feet (6 meter) in length & root is 6 inch.

= [NB] The root passes at post abd. wall in front of:-

① the 3rd part of duodenum.

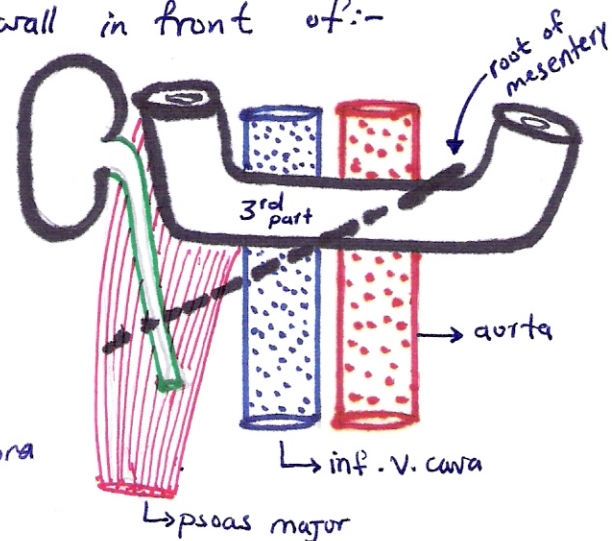
② abd. aorta.

③ inf. vena cava.

④ Rt psoas major ms. &

⑤ Rt ureter.

(root runs from left side of L2 vertebra to right sacroiliac joint.)



⑨ falciform Ligament:.

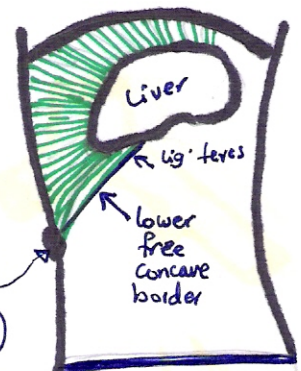
= fold of perit. connecting the liver to ant. abd. wall.

= Borders:- ① upper convex border attached to diaphr.

(lower surface) & ant. abd. wall (upto umbilicus)

② lower concave (free border) from umbilicus to liver contain ligamentum teres (or round lig. of liver) which is obliterated (left umbilical vein)

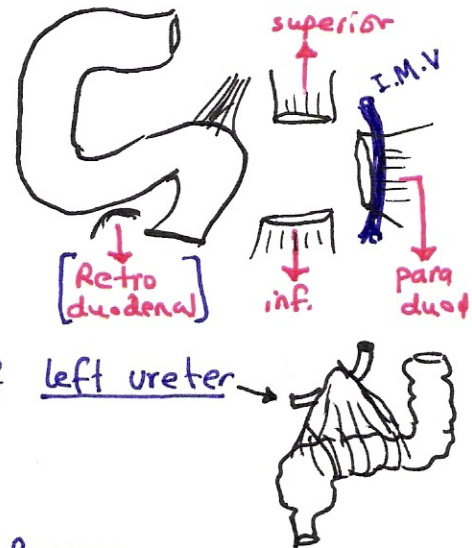
③ Base attached to superior & superior surfaces of liver.



Peritoneal Pouches, fossae, spaces & gutters :-

*Duodenal fossae :-

- in the region of duodeno-jejunal junction
- They are superior, inferior, para & retro duodenal.
- (NB: inferior mesenteric vein (IMV) runs in free margin of paraduodenal fossae.



*Inter sigmoid fossa :-

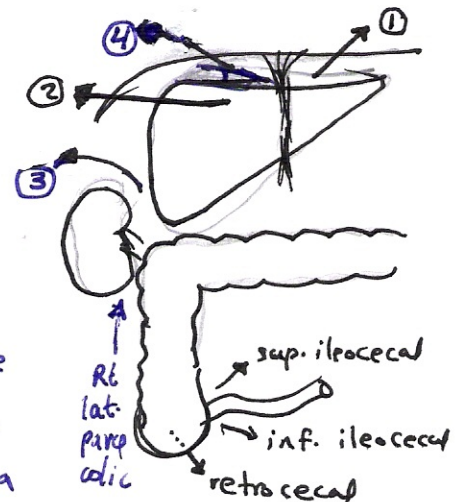
- Situated at apex of inverted V-shaped root of sigmoid mesocolon
- It's mouth opens downward & lies in front of left ureter

*Cecal fossae :-

- superior ileocecal, inferior ileocecal & retrocecal fossae

*Sub-phrenic spaces

- ① Left anterior subphrenic :- between diaphragm and liver on left side of falciform lig.
- ② Right ant. subphrenic :- between diaph. & liver on right of falciform.
- ③ Right post. subphrenic: between right lobe of liver, right kidney & right colic flexure.
- ④ Right extraperitoneal space: bet. bare area (between coronary lig.) and diaphragm



*Para-colic gutters :-

- ① Rt Medial paracolic gutter :- (closed off from pelvic cavity by mesentery of S.I)
- ② Rt lateral " " :- (communicate with Rt post. subphrenic.)
- ③ Lt Medial " " :- (communicate with pelvic cavity).
- ④ Lt Lateral " " :- (closed off from spleen by phrenicocolic lig.).

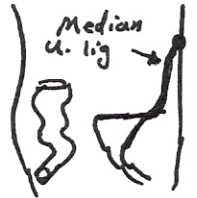
*Pouches :-

- Greater & lesser sacs → discussed before.

* Peritoneum at level of L₄ vertebra:

- Parietal peritoneum below umbilicus has 3 ligaments in anterior abdominal wall:

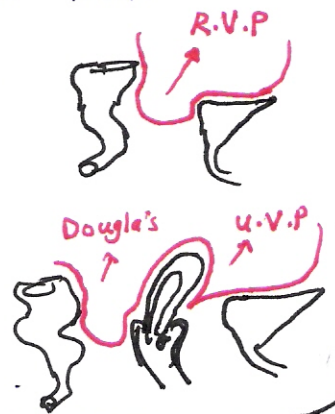
- ① Median umbilical ligament: from apex of bladder to umbilicus (remnant of urachus).
- ② Two lateral umbilical ligaments: from internal iliac arteries to umbilicus (obliterated umbilical arteries).



* Peritoneum at level of T₁₂ vertebra:

- form falciform ligament. which contains in its free border the ligamentum teres (obliterated left umbilical vein).
- Also on this section we can see lienorenal lig., gastro splenic omentum (lig.), lesser omentum.

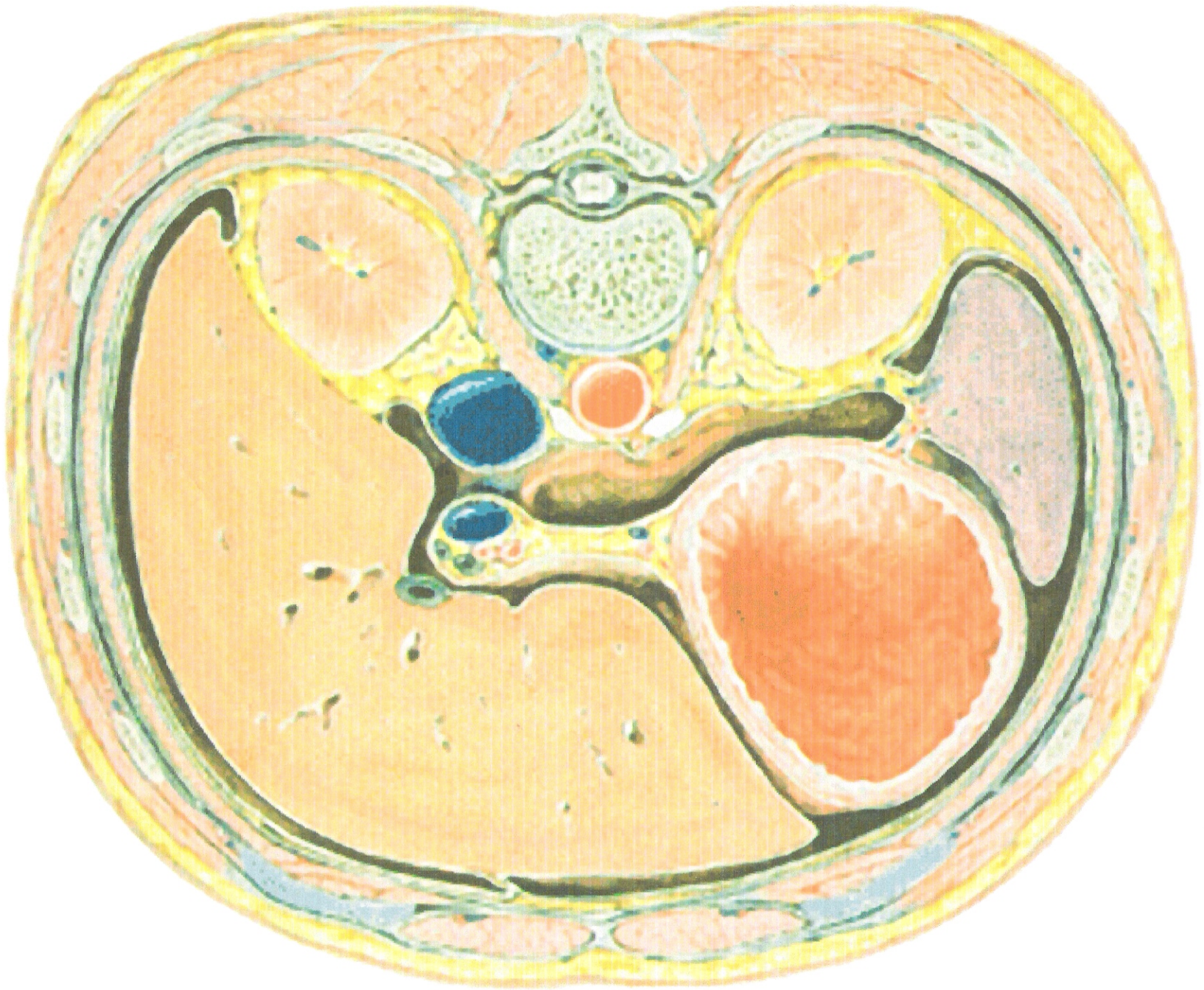
- * **N.B.** - peritoneum in pelvis reflected from the front of rectum to posterior (^{uppermost}) surface of bladder forming Rectovesical pouch in ♂
- In female reflected from rectum to posterior surface of upper vagina forming the recto-uterine (Douglas' pouch) & from uterus to bladder forming utero-vesical Pouch (u.v.p).



Retro Peritoneal space: is space between Peritoneum & Post. abdominal wall extends from T₁₂ to sacrum iliac crest has fat bed to retroperitoneal organs

Nerve supply of Peritoneum:-

- ① visceral Peritoneum: (sensitive only to stretch & tearing).
- supplied by autonomic afferent nerves.
- ② Parietal Peritoneum: (sensitive to Pain, touch & temperature).
- ^{lining} anterior abdominal wall → lower 6 thoracic & L₁ nerves
- lining diaphragm → Central: by phrenic, Peripheral by lower 6 thoracic pressure
- lining pelvis → Obturator nerves.



STOMACH

It's the most distensible part of the G.I.T.

* (DESCRIPTION): (organ of 2)

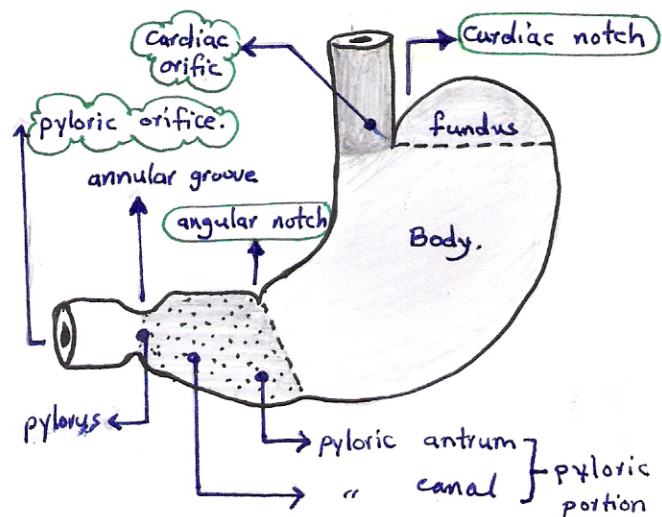
- Site: It lies in Lt hypochondrium, epigastrium & umbilical regions.
 → has no anatomical sphincter but physiological.
- openings:- two openings: Cardiac orifice & pyloric orifice
 → has anatomical & physiological sphincter
- Borders:- two; Lesser curvature (Rt border) & greater curvature (Lt border).
- Notches: two; Cardiac notch (incisura cardiaca) & angular notch (incisura angularis).
- Surfaces:- two; anterosuperior & postero-inferior surfaces.
- Divisions:- two; Cardiac portion & pyloric portion

- the Cardiac portion is divided into fundus & body.

- the pyloric portion divided into pyloric antrum & canal which ends in the pylorus

● How to identify pylorus;

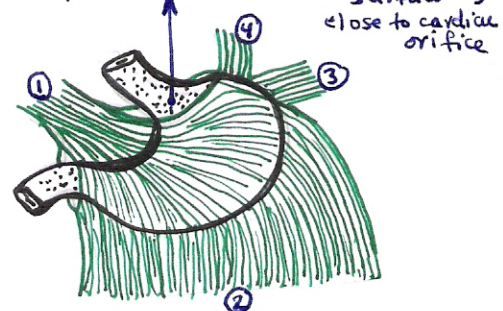
- 1 - thick (pyloric sphincter).
- 2 - annular groove (encircle it).
- 3 - prepyloric vein (vein of Mayo) in front of pylorus. (bet. Rt gastric & Rt gastroepiploic v.)



* (PERITONEAL COVERING):

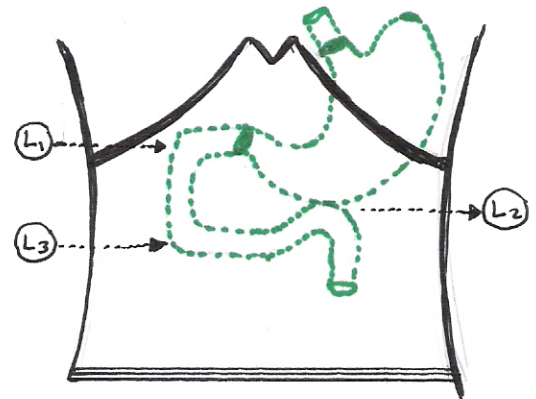
Stomach is completely covered by peritoneum except bare area (post. inferior surface close to cardiac orifice) & has 4 peritoneal folds

- | | |
|------------------|----------------------|
| ① lesser omentum | ③ gastrosplenic lig. |
| ② Greater " | ④ gastrophrenic lig. |



* (SURFACE ANATOMY) :

- Cardiac orifice: at one inch from tip of 7th costal cartilage (Lt side). (4 inch deep)
- Pyloric orifice: at $\frac{1}{2}$ inch right to midline at L₁ (transpyloric plane).
- fundus :- at Lt 5th intercostal space 3.5 inch to Lt [point of meeting of apex of heart, fundus & Lt lobe of the liver]
- lesser curvature by concave curve to the right & greater " " convex " " " " Left.

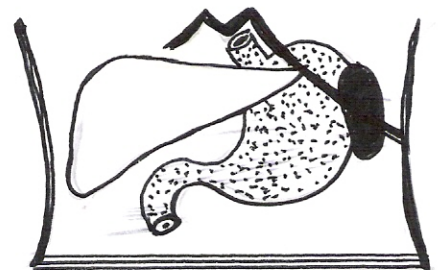


shape of stomach $\left\{ \begin{array}{l} \text{J-shaped: in tall person} \\ \text{steer-horn: in short obese} \end{array} \right.$

* (RELATION) :

① Anterosuperior :-

- liver (Lt lobe & quadrate lobe)
- anterior abd. wall .
- left costal margin.
- Diaphragm $\rightarrow$ Lt pleura & Lt lung -



② Posterior-inferior :-

- called stomach bed which is separated from stomach by lesser sac.
- The Stomach bed (post. relation) consists of :-



spleen separated from stomach by greater sac

transverse colon $\rightarrow$ trans. mesocolon $\rightarrow$ pancreas $\rightarrow$ spleen $\rightarrow$ splenic artery, Lt kidney (upper pole), Lt suprarenal gland & diaphragm (Lt crus).

N.B: stomach has folds inside (mucosa) mainly runs longitudinal called Rugae.
- Stomach stores about 1500 ml of food in adult.

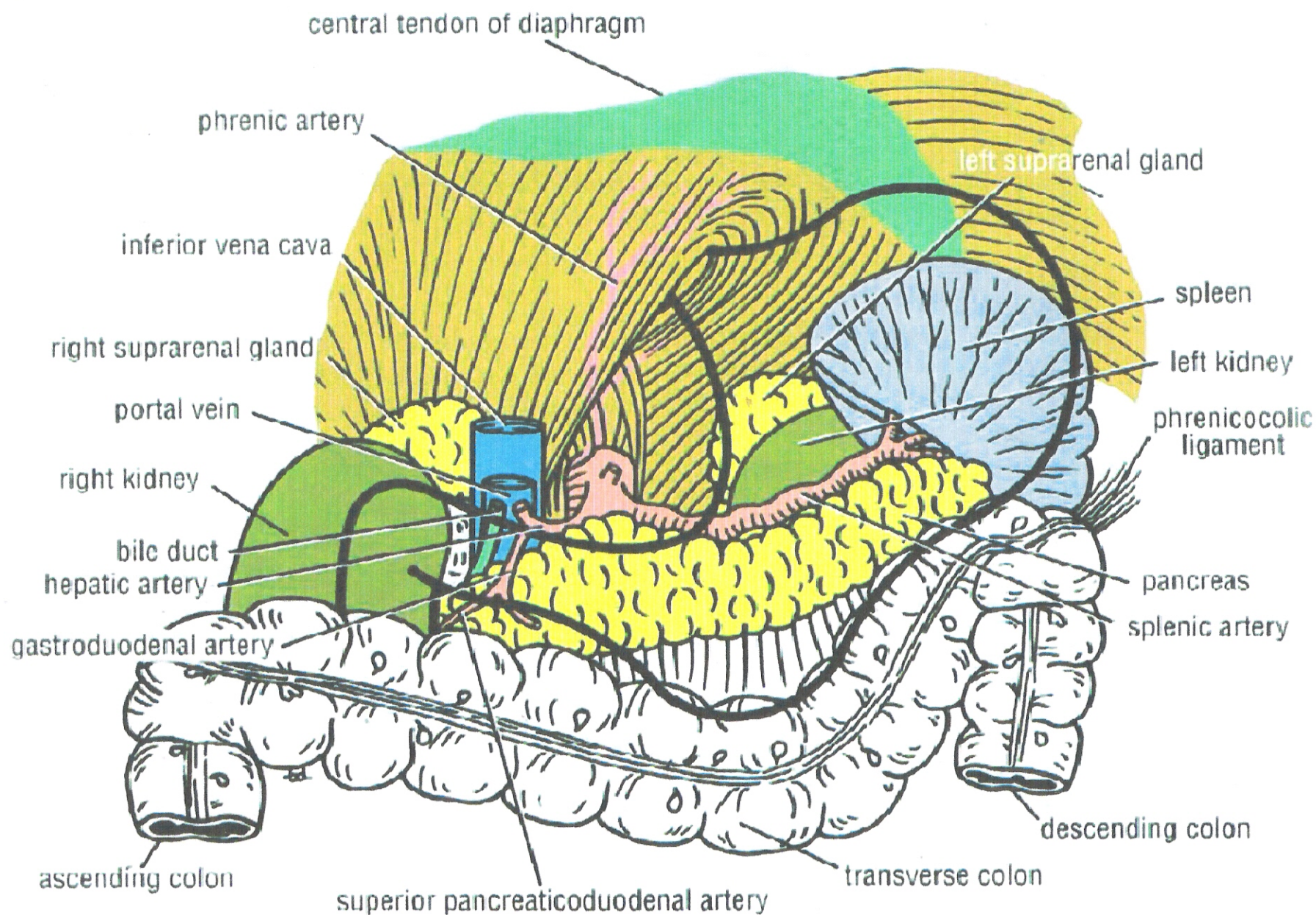
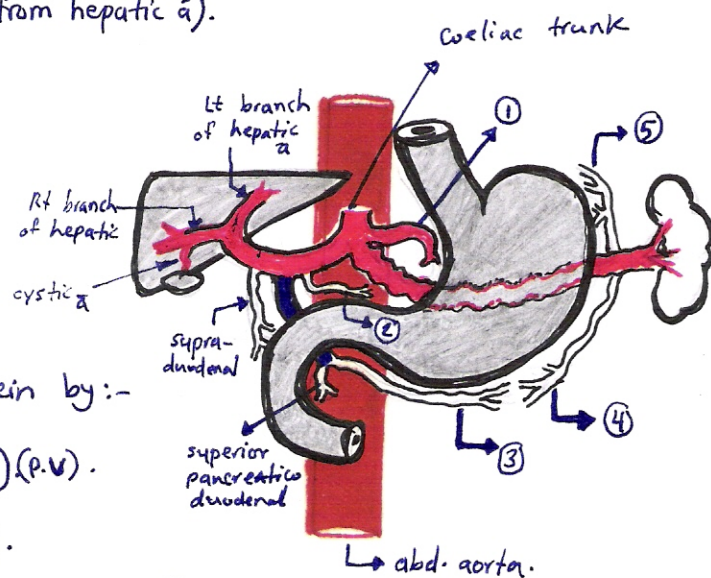


Figure 5-4 Structures situated on the posterior abdominal wall behind the stomach.

* BLOOD SUPPLY

Stomach is part of foregut so supplied by branches of Coeliac artery by:

- ① Lt gastric artery (direct br. of coeliac).
- ② Rt " " (from hepatic artery).
- ③ Rt gastroepiploic (from gastroduodenal from hepatic a).
- ④ Lt " " (from splenic).
- ⑤ Short gastric a (from splenic a).



* VENOUS DRAINAGE

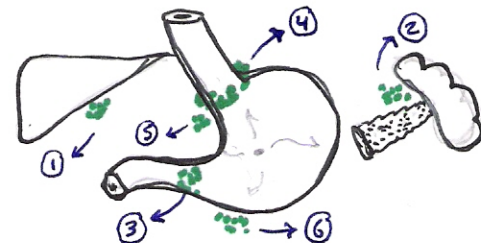
Stomach veins drain into portal vein by:-

- ① Lt gastric vein (drain into portal vein) (P.V).
- ② Rt " " (" " " ").
- ③ Rt gastroepiploic (into superior mesenteric V. → P.V).
- ④ Lt " " (into splenic V. → P.V).
- ⑤ Short gastric v. (into " " → " ").

* LYMPHATIC DRAINAGE

Stomach drains lymph into coeliac L.N by.

- ① hepatic LN ② pancreaticosplenic LN.
- ③ pyloric LN ④ paracardial L.N.
- ⑤ Lt gastric ⑥ Rt gastroepiploic L.N.

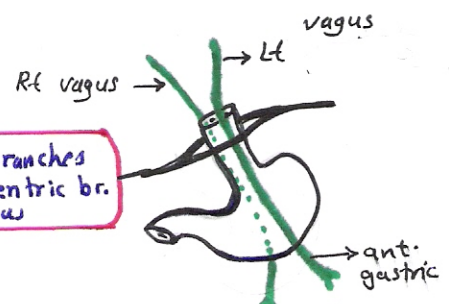


* NERVE SUPPLY

Ant. gastric N. give hepatic & pyloric branches
Post " " " coeliac & sup. mesenteric br.
plexus

Sympathetic from symp. plexus of coeliac plexus.

Parasympathetics from ant. & post gastric N. (Lt & Rt vagus respectively).



SMALL INTESTINE

خاکه میلا...

It can be divided into:

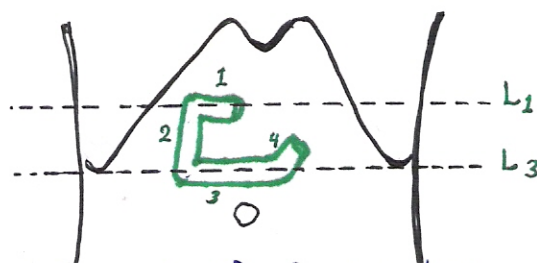
- ① Fixed part :- [10 inches] → Duodenum.
- ② Free part :- [20 feet] → Jejunum (3/5) and Ileum (3/5).

DUODENUM:

* DESCRIPTION:

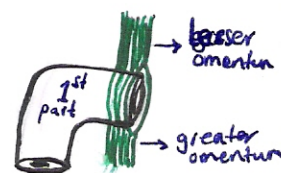
- It's the shortest, widest & most fixed part of small intestine.
- It's C shaped, curved around head of pancreas.
- It's divided into 4 parts.

* SURFACE ANATOMY:

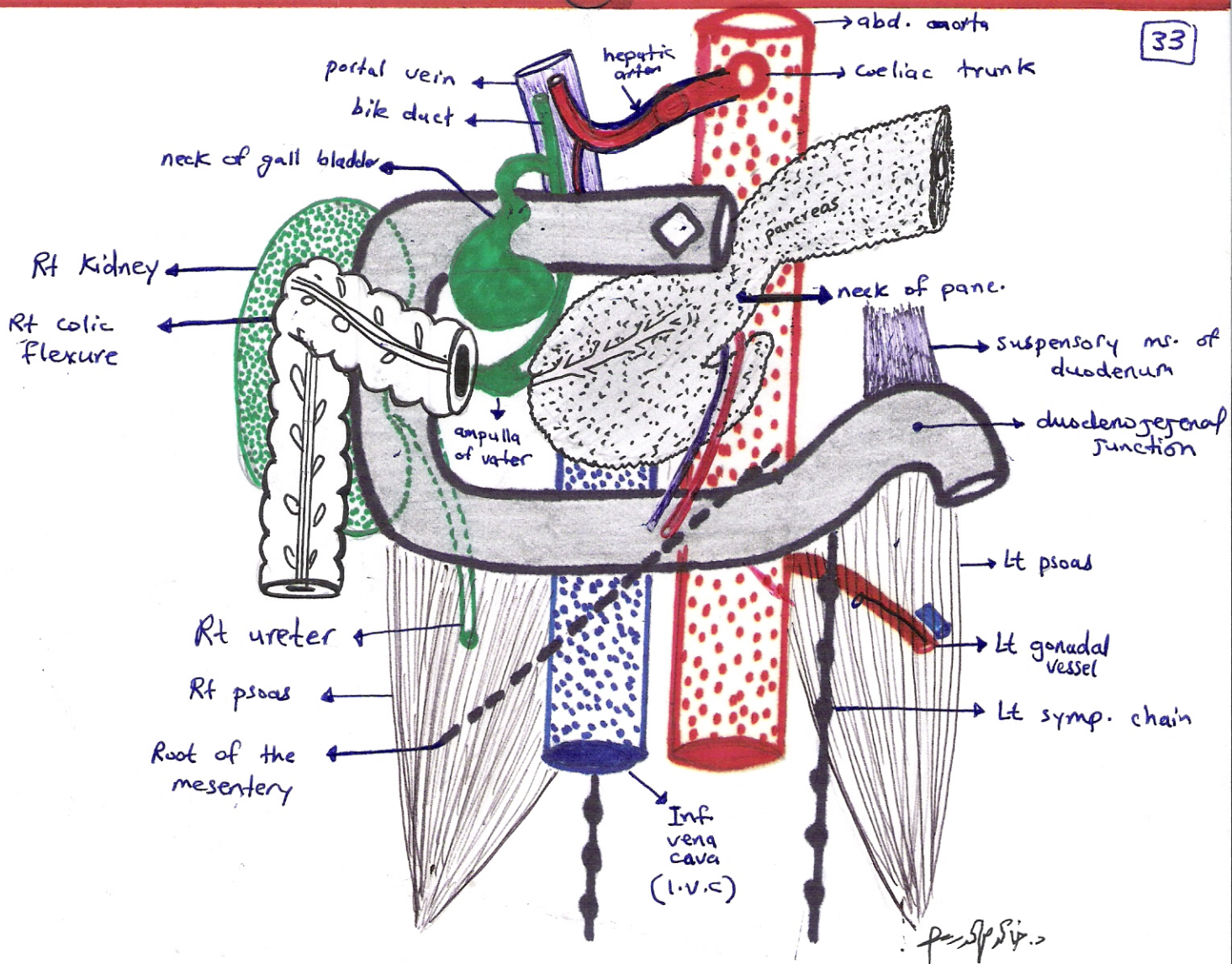


- 1st part :- 2 inches long.
 - start at pylorus (1/2 inch to Rt of midline at L1) for 2 inches horizontally at transpyloric plane (L1) (runs upward & backward)
- 2nd part :- 3 inches long.
 - vertically downward from L1 (transpyloric) to L3 (subcostal) for 3 inches
- 3rd part :- 4 inches long. (or 3 inches).
 - horizontally to the Lt for 4 inches at L3 plane.
- 4th part :- 1 inch. long. (or 2 inches).
 - upward for 1 inch (from L3 to L2 level).

PERITONEAL COVERING



- Duodenum is retroperitoneal (fixed) except 1st inch of 1st part which is completely covered (free = mobile) by greater & lesser omentum.



RELATION OF DUODENUM

	Anterior	Posterior	Superior	Inferior
First part ①	1 st inch: quadrate lobe of liver 2 nd inch: neck of gall bladder	1 st inch: neck of pancreas & lesser sac 2 nd inch: bile duct, gastroduodenal a and portal vein, IVC	epiploic foramen	head of pancreas
Third part ③	- root of mesentery of sm. int. - superior mesenteric vessels - coils of small intestine	Abd. aorta, IVC, Rt gonadal vessel Rt psoas, Rt ureter	head of pancreas	coils of small intestine (jejunum)

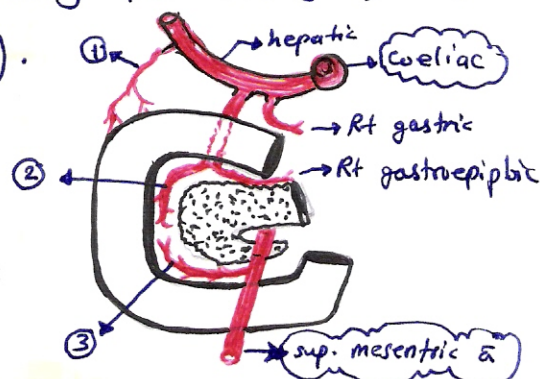
	Anterior	Posterior	Medial	Lateral
Second part ②	- coils of small int. - transv. colon. - Rt lobe of liver. - fundus of gall bladder	- Rt Kidney & its hilum & ureter - Rt renal vessels	- head of pancr. - bile duct, - ampulla of Vater	- Rt lobe liver - Rt colic flexure - ascending colon
Fourth part ④	Coils of small int.	Lt gonadal vessels, Lt psoas Lt symp. trunk & inf. mesentrie vessels	abd. aorta	/

BLOOD SUPPLY OF DUODENUM:

A) Arterial supply :-

The duodenum is supplied by Coeliac trunk (being from foregut) and superior mesenteric artery (being from midgut).

- ① supraduodenal a
 - ② superior pancreaticoduodenal a
 - ③ inferior pancr.-duod. a
- Coeliac
- superior mes.



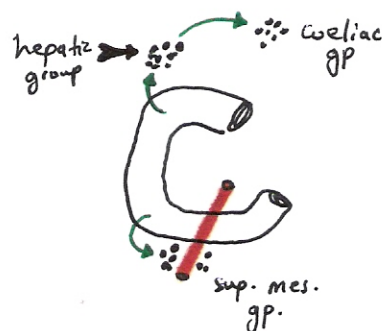
④ also from branches of Rt gastric & Rt gastroepiploic a (from coeliac).

B) Venous drainage:-

into splenic & superior mesenteric & portal vein.

LYMPHATIC DRAINAGE:

1. hepatic L.N. → coeliac group of L.N.
2. superior mesenteric group of L.N.



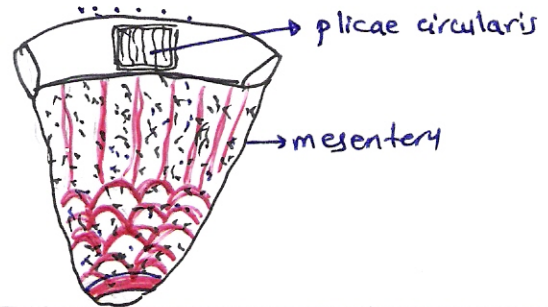
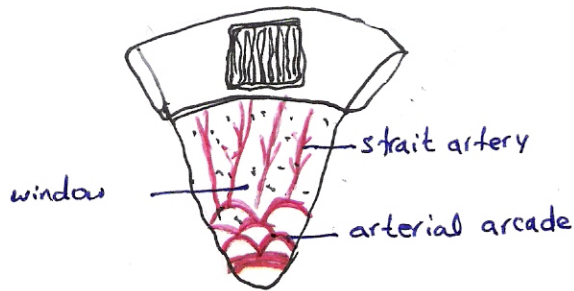
N.B: the duodenojejunal flexure is attached to the Rt crus of diaphragm by suspensory muscle.

N.B:- mucosa of duodenum is smooth in 1st part but in the rest of duodenum forms folds called Plicae circulares.

N.B:- Parasympathetic N/s of foregut & midgut reach via vagus N. ^{by coeliac} ^{sup. mesenteric} ^{plexus} but after splenic flexus of colon by pelvic splanchnic N. _(S2,3,4) by inf mesenteric plexus.

FREE PART OF SM. INT.

- The free part of small int. include jejunum & ileum, It's length is 20 feet (2/5 for jejunum).
- It extends from duodenojej. junction to ileocolic junction.
- It's attached to post. abd. wall by mesentery.

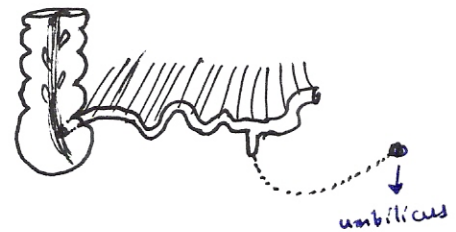


Jejunum	Ileum
- Shorter (2/5), ^{thicker} wider, <u>more red</u>	Longer (3/5), narrower.
- plicae circularis are more & larger	plicae are few & small.
- Villi are more & larger	Villi are fewer & smaller.
- Simple arterial arcades in mesentery 1 or 2	Complicated art. arcades.
- Small amount of fat in " (window)	more fat (less or no window)
- No lymphoid follicle.	many lymphoid follicle (Peyer's patches) in antimesenteric border of ileum (in mucous membrane of lower ileum) - may be visible from outside wall.

N.B. : Meckel's diverticulum - may be present in 2% of people & its length is $\approx$ 2 inches, 2 feet from the ileocolic junction (in antimesenteric border).

- It's the unobliterated proximal part of Vitellointestinal duct of foetus

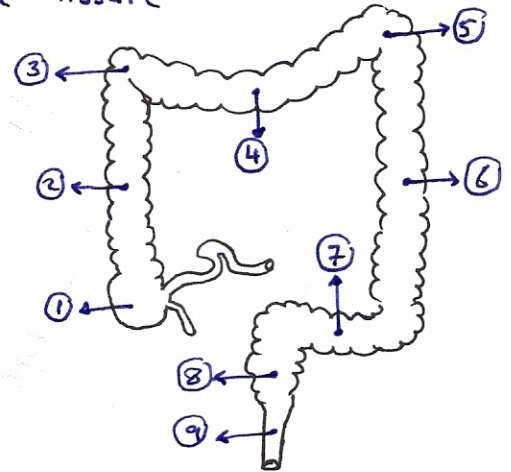
- Clinically may be misdiagnosed as appendicitis.



LARGE INTESTINE

- It's about 5 feet long.
- It begins at end of ileum & ends at anal fissure
- It divides into

- ① Caecum & appendix ② ascending colon
- ③ Rt colic (hepatic flexure) ④ transverse colon.
- ⑤ Lt " (splenic) flexure ⑥ Descending "
- ⑦ sigmoid colon. ⑧ rectum ⑨ anal canal.
- ⑩ appendix.



DIFFERENCE BETWEEN SMALL & LARGE INT. :-

Large intestine	small int.
① wall has sacculatation or haustration	No sacculatation
② has Taeniae coli (3 longitudinal muscles bands) (converge at base of appendix forming complete muscle coat)	No taenia coli
③ has epiploicae appendices (peritoneal projection filled with fat)	No appendices epiploicae
④ has no plicae circularis, no villi, no peyer's patches	has.

[N.B] - The ileum opens into caecum, and the opening is raised to form the ileocaecal valve. (2 lips; play little or no part in preventing cecal content reflux to ileum)

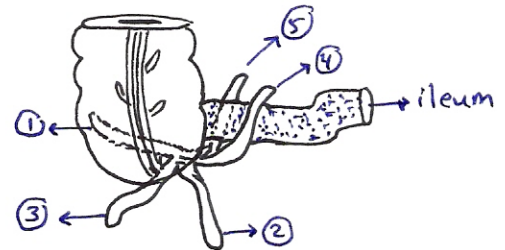
- The vermiform appendix also opens into caecum (posteromedial part) about inch below ileo-caecal valve.
- The ascending colon, descending colon & rectum are fixed as they are retroperitoneal (covered by perit. from front & sides)
- The appendix, transverse & sigmoid colon are covered by mesoappendix, trans. mesocolon & sigmoid mesocolon respectively.
- also caecum is completely covered by peritoneum.

APPENDIX

The vermiform appendix is narrow worm-like tube with base attached or opened into posteromedial aspect of caecum

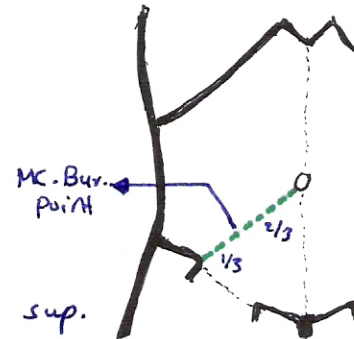
POSITION may be

- ① Retro-caecal (74%) ④ pre-ileal (1%)
- ② pelvic (21%) ⑤ post-ileal (0.5%)
- ③ Subcaecal (3.5%)



SURFACE ANATOMY

- MC Burney's point: indicates the surface anatomy of base of appendix
- the point is the junction between Lateral $\frac{1}{3}$ and medial $\frac{2}{3}$ (or middle $\frac{1}{3}$) of a line between ant. sup. iliac spine and umbilicus.



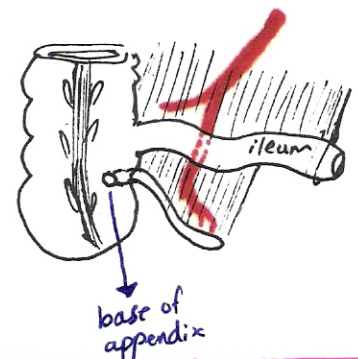
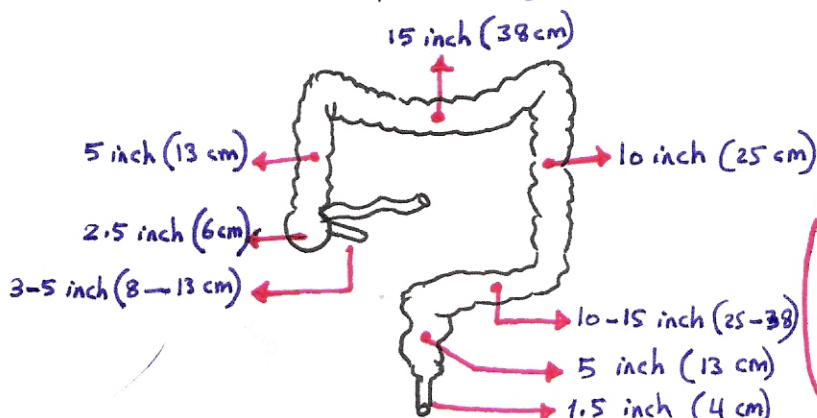
BLOOD SUPPLY

- * Arterial supply by appendicular artery br. of ilioocolic artery. it descend behind the ileum
- * Venous drainage by appendicular vein into ilioocolic vein

Posterior cecal a. br. of 2

LYMPHATIC DRAINAGE

- into ilioocolic group of lymph nodes.



N/S :- symp. & parasymp. (vagus) from sup. mesenteric plexus.
- afferent nerves (visceral pain) accompany symp. nerves & enter spinal cord at T10

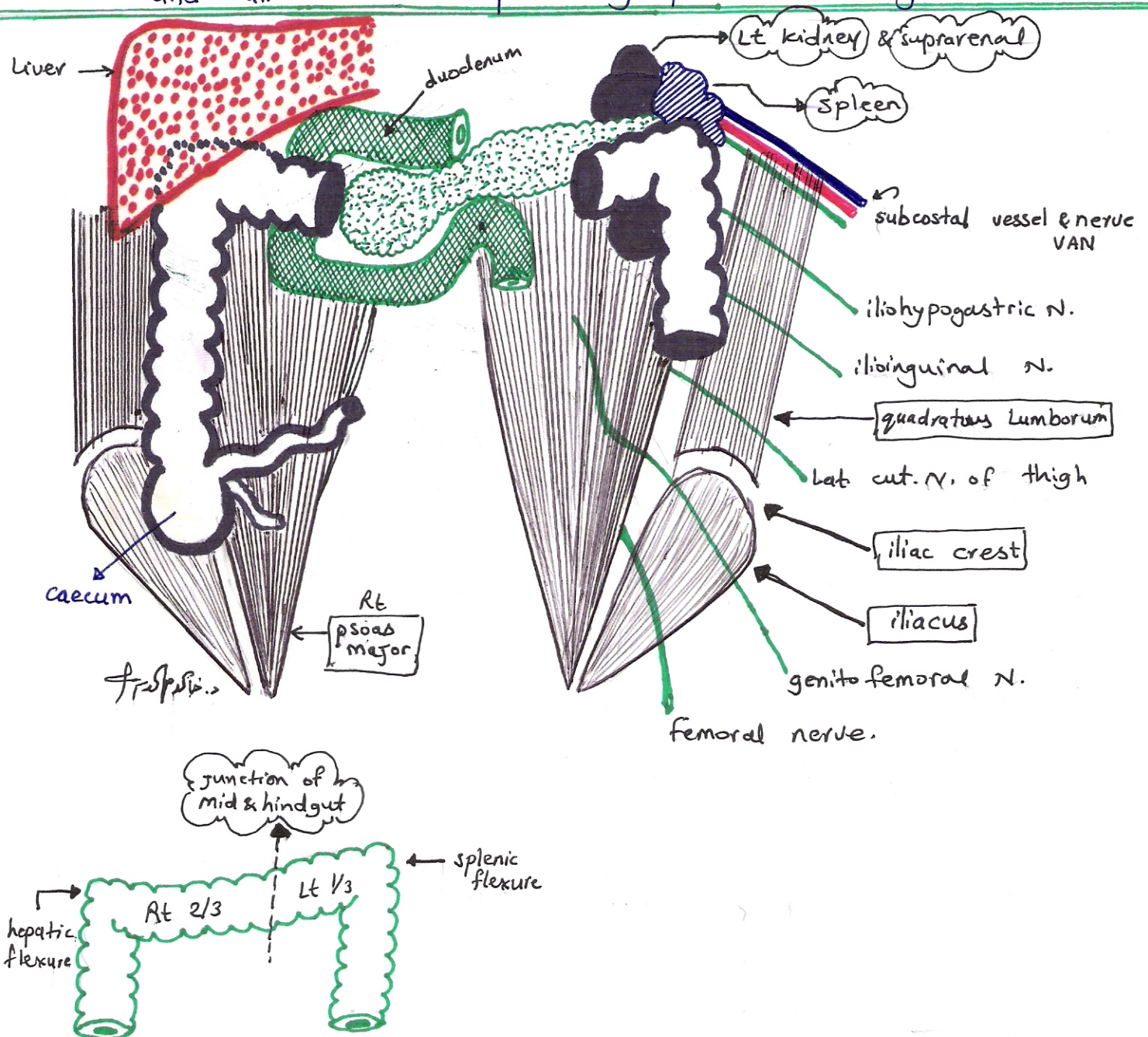
RELATION OF THE COLON :

	Anteriorly	posteriorly	others.
Caecum	- ant. abd. wall. - greater omentum - Coils of small intest.	- iliacus , psoas major. - genitofemoral N. , Femoral N. and Lat. cut. N. of thigh - ext. iliac artery & appendix. - appendix	Medially :- (Lt) - coils of small int - appendix.
Ascending	- ant. abd. wall. - greater omentum. - Coils of small int.	- iliacus, iliac crest, quadratus lumborum. - Lat cut. N. of thigh. - iliohypogastric & ilioinguinal. - fat in front Rt kidney.	Medially : (Lt) coils of small int.
Descending colon	- ant. abd. wall. - greater omentum - Coils of small int.	- iliacus, iliac crest , quadratus lumborum & psoas major. - genitofemoral N. , femoral N. , lat cut N. of thigh, iliohypogastric , ilioinguinal , subcostal N. & vessels - ext. iliac a & gonadal vessels.	Medially (Rt) coils of small int.
Transverse colon	- ant. abd. wall. - greater omentum - Stomach, liver (Rt lobe) & gall bladder (Body)	- duodenum (2nd part) , head of pancreas, duodeno - jejunal flexus & coils of small intestine - Lt kidney.	inferiorly coils of small intestine

(N.B.) the Rt colic flexure is related to the Rt lobe of the liver (ant., superior & laterally) but posterior & medial to the Rt kidney

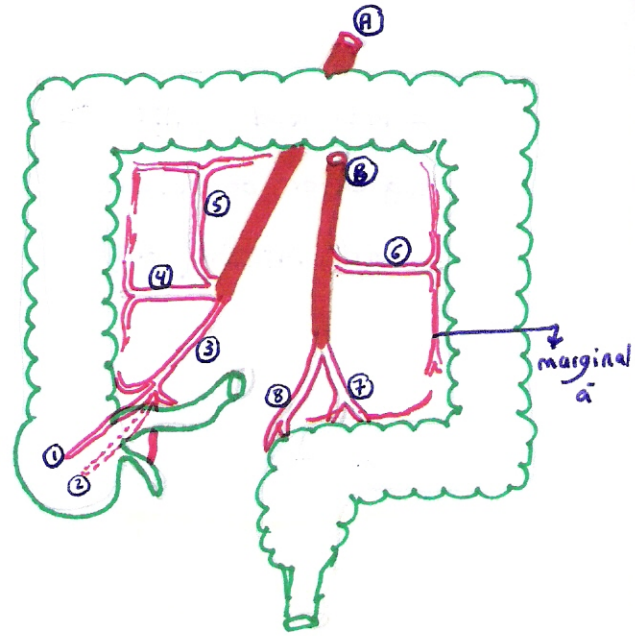
(N.B.) the Lt colic flexure is related to the spleen & tail of pancreas (superiorly) and Lt kidney (medially).

(N.B.) the Lt colic (splenic) flexure is higher than Rt (hepatic) and attached to diaphragm by phrenico-colic ligament.



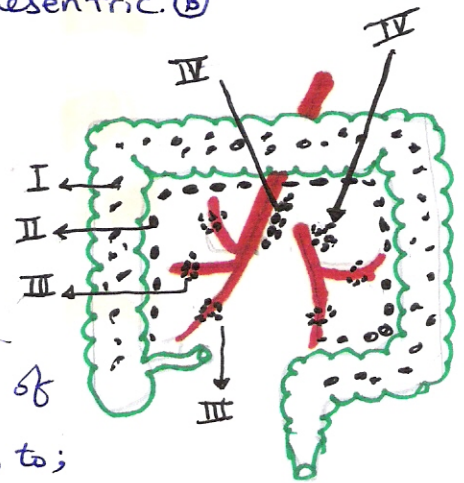
BLOOD SUPPLY OF COLON

- The caecum is supplied by ant.^① & post.^② caecal branches of iliocolic artery^③ which is branch of sup. mesenteric a^④
 - veins drain into iliocolic vein → → → portal
- ascending colon supplied mainly by the Rt colic^④ branch of sup. mesenteric.
 - veins opposite → portal vein.
- Transverse colon supplied by middle colic^⑤ → br. of sup. mesenteric (midgut) (anterior 2/3) and Left colic^⑥ → " " inf. " (hindgut) (lateral 1/3).
- Descending mainly by left colic (upper left colic) and sigmoidal (or lower left colic) branches of inferior mesenteric.^⑦
- The above branches anastomose with each other at the concavity of colon forming Marginal artery



LYMPHATIC DRAINAGE OF COLON:-

- I - Epicolic LN: on the wall, to;
- II - paracolic LN: on inner side of colon, to;
- III - intermediate colic LN: along colic branches of sup. & inferior mesenteric arteries, to;
- IV - Terminal colic LN: along sup. & inf. mesenteric vessels

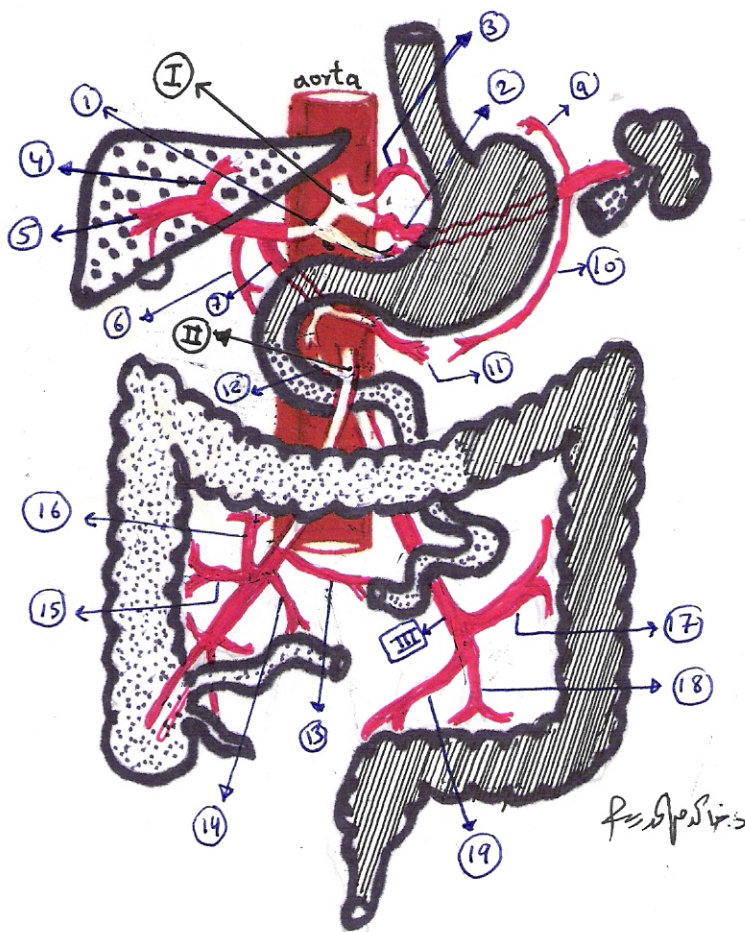


BLOOD SUPPLY OF THE GUT

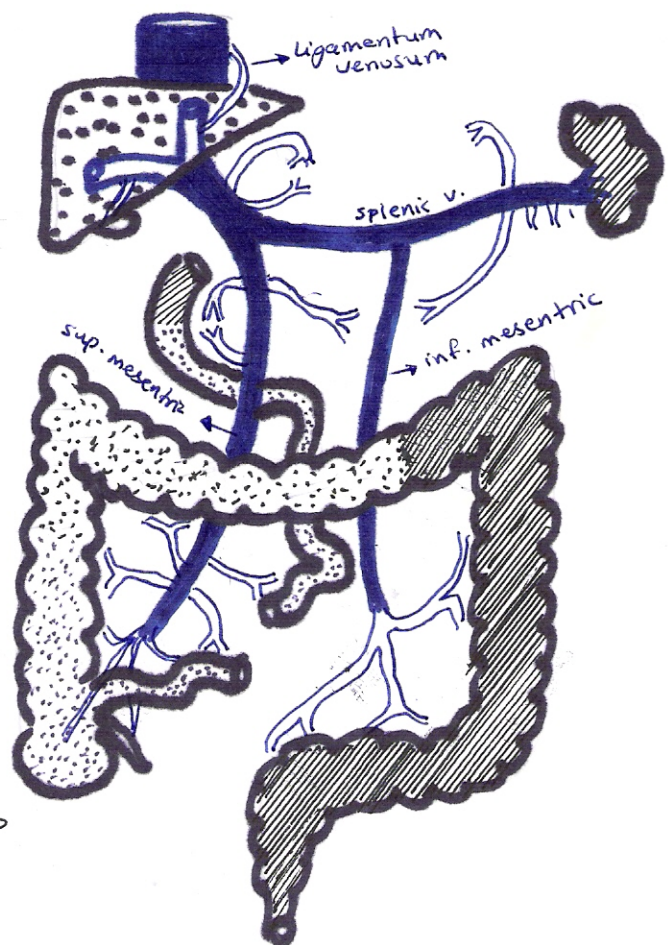
د. محمد عبد الله

* The gut is divided embryologically into 3 parts

- ① Foregut: from esophagus to $\frac{1}{2}$ the duodenum $\Rightarrow$ supplied by coeliac.
- ② Midgut: from $\frac{1}{2}$ duodenum to proximal $\frac{2}{3}$ of transverse colon $\Rightarrow$ supplied by superior mesenteric artery.
- ③ Hindgut: from proximal $\frac{2}{3}$ of trans. colon to upper $\frac{1}{2}$ of anal canal. $\Rightarrow$ supplied by inferior mesenteric artery.



Arterial
supply



portal
circulation

I COELIAC TRUNK:

- It's a branch of abd. aorta at upper border of L₁.

- It supplies the foregut

Branches:- (A) Lt gastric artery (3)

(B) hepatic artery (1) gives → • Lt hepatic branch (4)

• Rt hepatic (5) gives → cystic a to gall bladder

• supraduodenal (6)

• Rt gastric (8)

• gastroduodenal (7) gives → sup. pancreaticoduodenal
- Rt gastroepiploic (11)

(C) Splenic artery (2) gives → • splenic branches

• pancreatic ~

• short gastric a (9)

• Lt gastroepiploic (10)

II SUP. MESENTRIC A. ∴

- It's a branch of abd. aorta at lower border of L₁.

- It supplies the midgut

Branches:- inferior pancreaticoduodenal (12)

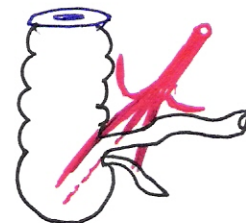
- Jejeunal branches (13)

- Ileal branches (14)

- Iliocolic artery gives → ileal br.
→ ascending br
→ appendicular
→ ant. caecal
→ post. caecal

- Rt colic (15)

- Middle colic (16)



III INF. MESENTRIC A

- It's a branch of abd. aorta at L₃ level.
- It supplies the hind gut.
- Branches
 - Lt colic (upper Lt colic) (17)
 - sigmoidal (lower Lt colic) (18)
 - superior rectal (19)

PORTAL VEIN

- * It's formed by the union of splenic & superior mesentric veins behind the neck of pancreas
- * It ends by entering the porte hepatic of liver & divides into Rt branch (receives cystic vein) and Lt branch (receives paraumbilical vein with ligamentum teres).
- * Direct tributaries are
 - Rt gastric vein.
 - Lt " "
 - splenic & sup. mesentric
- * Tributaries of splenic vein :-
the same as branches of splenic artery (splenic, pancreatic, short gastric, Lt gastroepi. veins) + inferior mesentric vein (which receives the same as branches given by inf. mes. artery).
- * Tributaries of superior mesentric vein :-
- the same as branches given by sup. mes. artery + superior pancreaticoduodenal & Rt gastroepiploic

PORTO-SYSTEMIC ANASTOMOSIS

- They are the sites where there is anastomosis between the portal circulation (portal vein) and systemic circulation (sup. vena cava & i.v.c).

① - At the lower end of esophagus:-

- between tributaries of Lt gastric v. (portal) and azygos veins (systemic)
- If enlarged veins called → ESOPHAGEAL VARICES

② - At the upper end of rectum:-

- between tributaries of superior rectal v. (portal) and middle & inf rectal (systemic)
- If enlarged → PILES (or hemorrhoids)

③ - At umbilicus:-

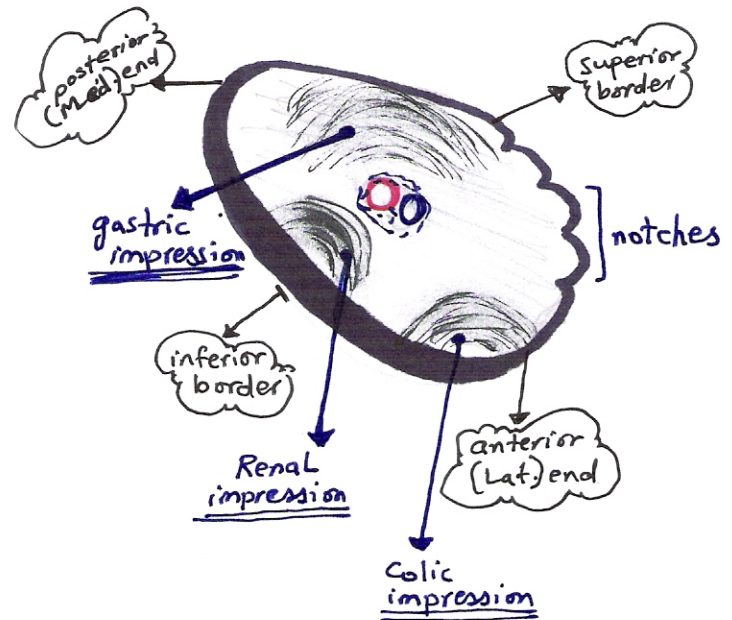
- between Lt portal vein (portal) and veins of ant. abd. wall (systemic through paraumbilical veins [w pass through lig. teres]).
- If enlarges → CAPUT MEDUSAE



SPLEEN

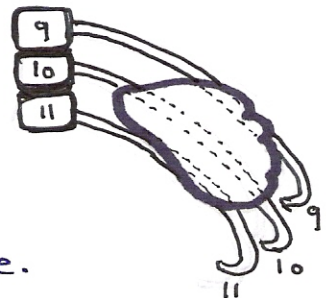
* DESCRIPTION

- The spleen has two ends:
 - Medial (post) → pointed.
 - Lat. (ant) → broad & Notched
- The spleen has two borders:
 - Superior → sharp & Notched
 - Inferior → rounded.
- The spleen has two surfaces:-
 - Medial → contains hilum (visceral surface).
 - Lateral → related to diaphragm (diaph. surface).
- (spleen is 1 inch thick, 3 inch wide, 5 inch long, 7 ounces wt & 9-11 ribs related)
reddish in colour. [ie spleen 1.3.5.7.9.11]



* SURFACE ANATOMY

- The spleen lies in the left hypochondrium.
- The Long axis corresponds to 10th rib.
- The lateral surface " " 9th, 10th & 11th ribs.
- The ant (Lat) end reaches the midaxillary line.
- The post. (Med) end is 1½ inch from vertebrae.



* PERITONEAL COVERING

- The spleen is surrounded by peritoneum & has two ligaments:
 - Gastrosplenic lig with stomach (contains short gastric vessels)
 - Lienorenal lig with Lt kidney (" splenic vessels & panc. tail).



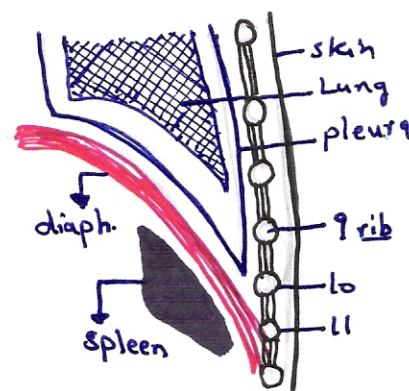
* RELATION:

* Medial (visceral) surface is related to:

- Stomach (above hilum) → [Gastric impression]
- Lt kidney (inferior & post. to hilum) → [Renal impression].
- Lt colic flexure (inf. & ant. to hilum) → [Colic impression].
- Tail of pancreas (at the hilum) → [pancr. impression].

* Lateral (diaph.) surface is related to:

- Left Lung & Lt pleura
- Diaphragm.
- the 9th, 10th & 11th ribs & intercostal spaces.



* BLOOD SUPPLY

- Splenic artery :- branch of coeliac trunk & ends by 5 splenic branches in the hilum, it's tortuous artery.
- Splenic vein :- runs behind pancreas (splenic artery above panc.) and unite with sup. mesenteric vein behind the neck of pancreas to form portal vein.

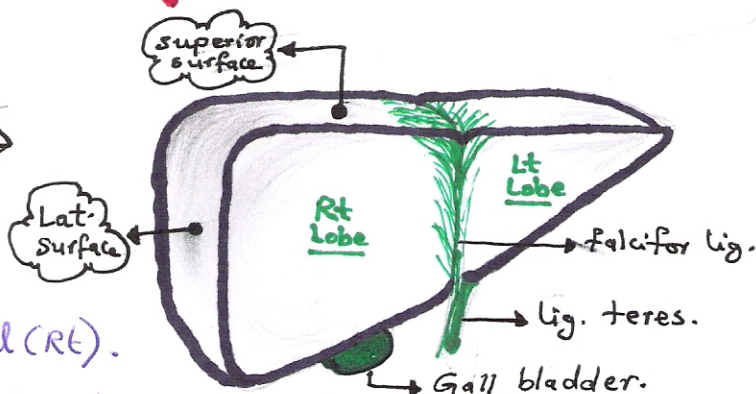
* LYMPHATIC DRAIN

- To pancreatico-splenic group of lymph nodes.

LIVER

* DESCRIPTION:

- * The liver is wedge-shaped, having 5 surfaces: ant, post, superior, inf. & Lateral (Rt). and the lat. surface forms the base.

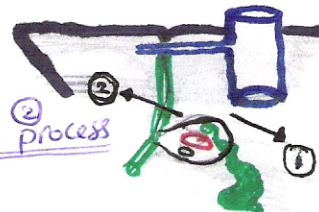


- * The liver is divided into two lobes Rt & Lt by:
 - ① Ligamentum teres inferiorly.
 - ② Ligamentum venosum posteriorly.
 - ③ falciform lig. superior & anterior.

- * The Rt lobe has 2 more lobes:

I. Caudate lobe: - at posterior surface, it

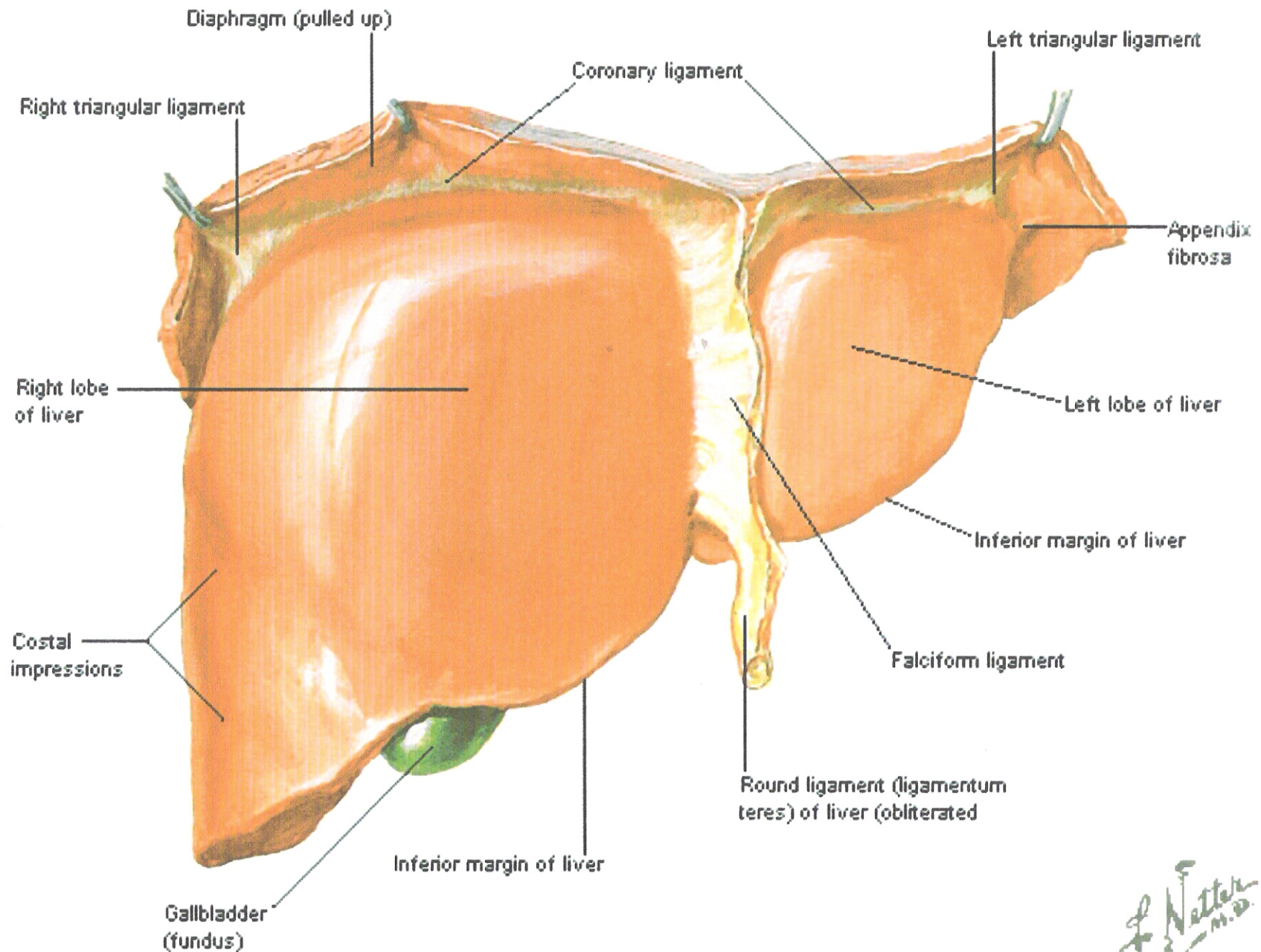
is bounded by lig. venosum (Lt side), Lt hepatic vein (superiorly), I.V.C. (Rt side) and porta hepatis (infer.) - Caudate lobe has process at inferior Rt angle called caudate process ① and other at inferior Lt angle called papillary process ②



II. Quadrate lobe: at inferior surface, bounded by: porta hepatis (posterior), lig. teres fissure (Lt side), gall bladder fossa (Rt side), inf. border of liver (anterior)

Surfaces and Bed of Liver

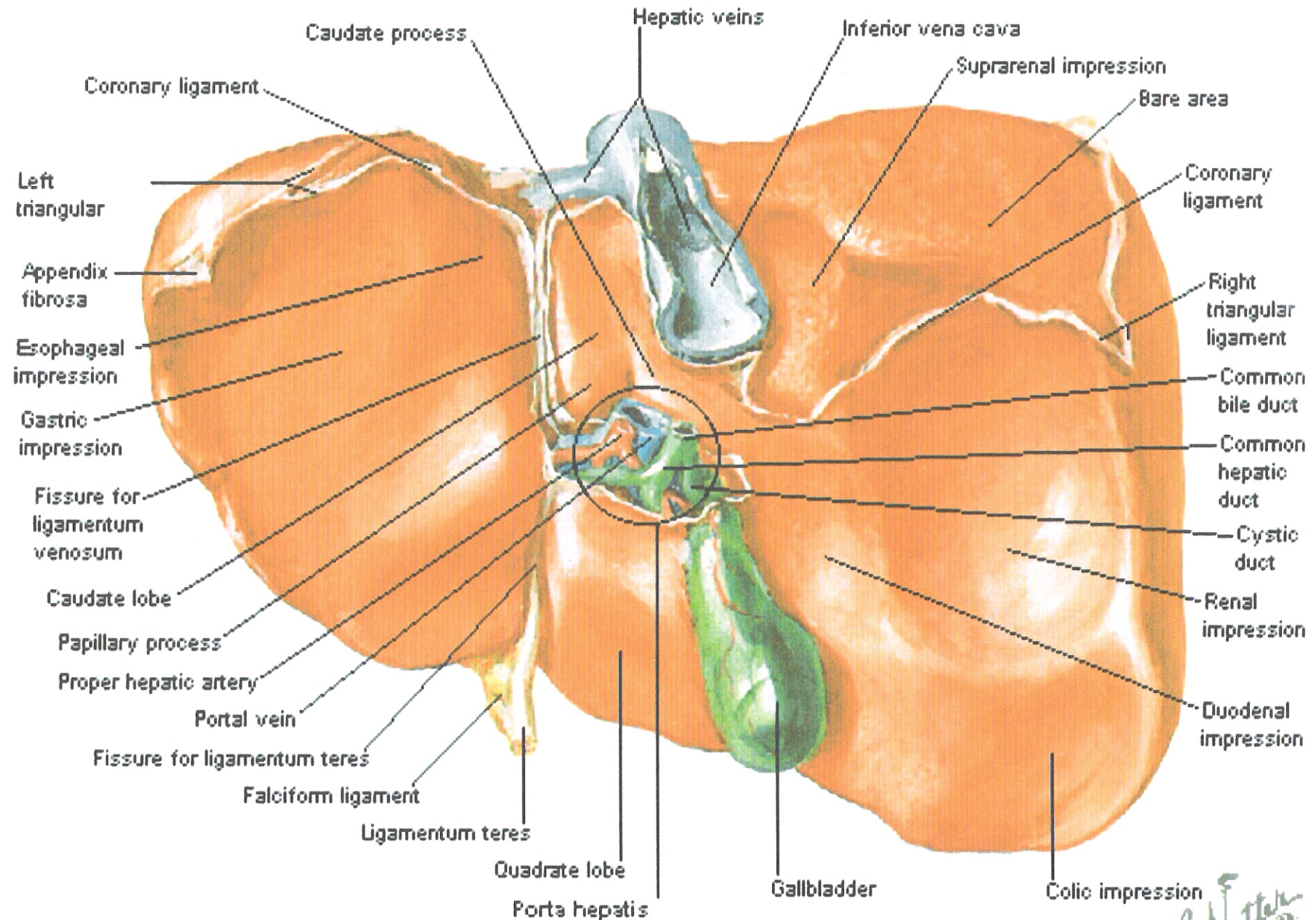
Anterior View



F. Netter M.D.

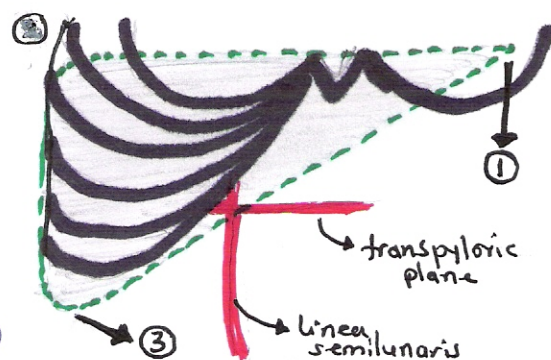
Surfaces and Bed of Liver

Visceral Surface



* (SURFACE ANATOMY):

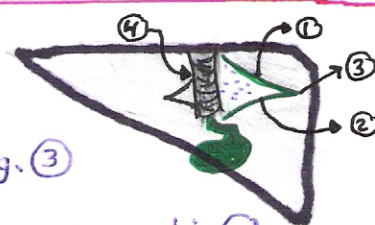
- The liver occupies all Rt. hypochondrium and parts of epigastrium & Lt. hypochondrium.
- The liver can be drawn by 3 points
 - point ① at apex of heart (Lt 5th I.C. space 3.5 inches from midline).
 - point ② at midaxillary line, 7th rib (Rt)
 - point ③ at " " 1cm below costal margin.
- The fundus of gall bladder is marked by meeting of 3 lines the transpyloric plane (L₁) with the tip of Rt 9th costal cart. and linea semilunaris.



* (PERITONEAL COVERING):

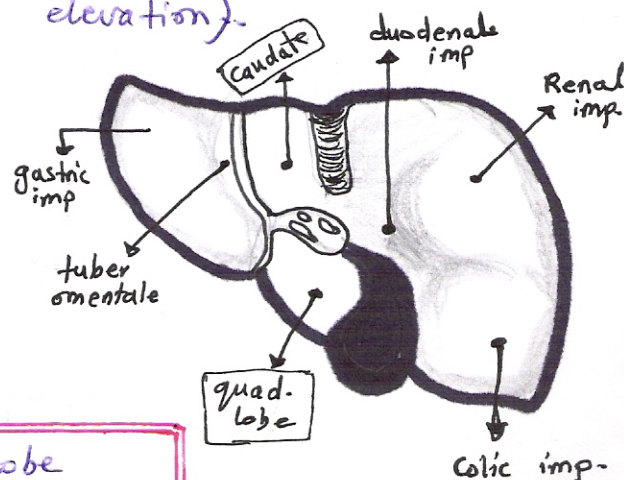
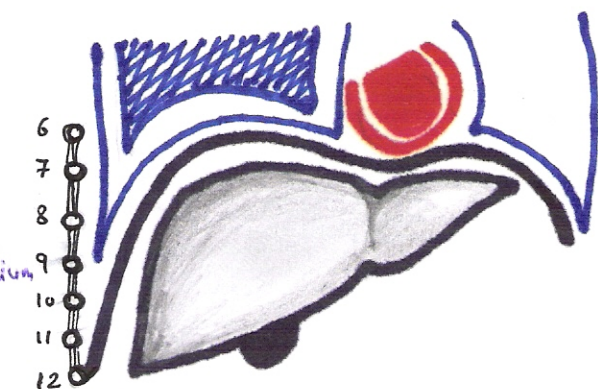
- The liver is covered by peritoneum, except bare areas:
 - ① Bare area of liver ② porta hepatis.
 - ③ groove of I.V. Cava ④ fossa for gall bladder
 - ⑤ fissure for lig. teres ⑥ fissure for lig. venosum
- The peritoneum has multiple folds which are:
 - ① falciform lig. ② triangular ligaments (Rt & Lt).
 - ③ Coronary lig. (upper & lower) ④ lesser omentum

- Bare area of liver is triangular with base formed by I.V.C. groove ④, apex Rt triangular lig. ③ above by upper coronary lig ① and below lower coronary lig ②.
- It comes in contact with diaphragm.



* RELATION:

- Superior surface is related to diaphragm, lung, pleura, heart & pericardium.
- Lateral (Rt) surface related to the diaphragm, Rt lung and pleura, ribs from 6-11 with intercostal spaces.
- Anterior surface to diaphragm & anterior abdominal wall.
- posterior surface to I.V.C (Rt lobe), esophagus (Lt lobe), also fundus of stomach (Lt lobe).
↳ esoph. notch.
- Inferior surface to body of stomach (Lt lobe), Colic impression (Rt colic flexure) [at Rt lobe anteriorly] and renal impression (for Rt kidney & Rt suprarenal gland) [at Rt lobe posteriorly].
- also inf. surface is related to 2nd part of duodenum called duodenal impression (beside neck of gall bladder).
- also area related to lesser omentum (Lt lobe) is called the "tuber omentale" (smooth round elevation).
- Quadrato lobe is related to
 - transverse colon (anteriorly).
 - pylorus & duodenum 1st part (middle).
 - less omentum (posteriorly)

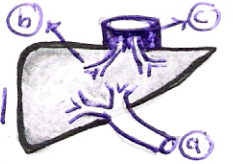


NB: the caudate process of caudate lobe forms the superior boundary of epiploic foramen

* BLOOD SUPPLY:

= Arterial supply by hepatic artery (branch of coeliac trunk) and give 2 terminal br. (Rt & Lt branches).

= The liver receives also venous blood from portal vein (a) and drains the blood to inf. vena cava (c)



by two hepatic veins (b) one from each lobe.

- [NB] - Bloody supply to liver obtained 30% from hepatic a & 70% from portal vein (but oxygen delivered to liver is 50% hepatic & 50% portal).

* LYMPHATICS:

- To hepatic group (at porta hepatis) to coeliac group of L.N.

- [NB] - liver produce about $\frac{1}{3}$ - $\frac{1}{2}$ lymph of body.

[NB] **PORTA HEPATIS**: is the hilum of liver, situated between caudate & quadrate lobes

- In porta hepatis there is:-

① hepatic plexus of nerve [N]

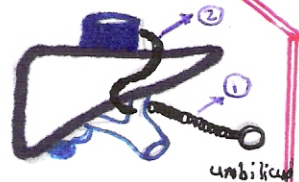
③ hepatic ^(Rt & Lt) artery [A] (middle)

⑤ Lymphatics [L]

(Rt & Lt) ② hepatic duct (anterior)

(Rt & Lt) br ④ portal vein [V] (posterior)

[NB] - **Ligamentum Teres** ^① is an obliterated umbilical vein and ends in the Lt branch of portal vein (the cystic vein ends in the Rt branch).



- **Ligamentum Venosum** ^② - is an obliterated ductus venosus and connects the Lt branch of portal vein to I.V.C.

-

GALL BLADDER

It supplied by cystic artery (from Rt branch of hepatic a) & drained by cystic vein (Join Rt branch of portal vein).

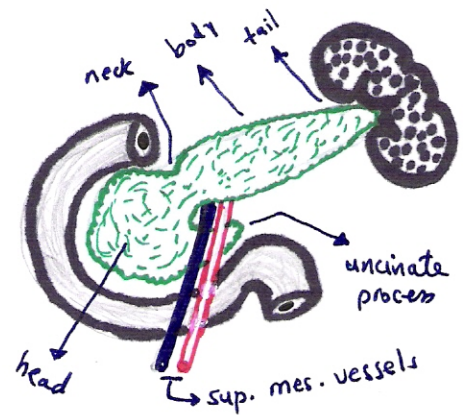
- ## Relation

✓ Post transv. colon, duodenum
1st & 3rd part.

PANCREAS

* DESCRIPTION :

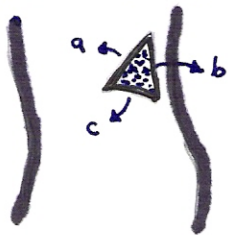
- The pancreas is an elongated gland lies transversely at post. abd. wall
- It extends from duodenum to spleen.
- It is composed of



① head: It lies in concavity of duodenum & have projection behind the superior mesenteric vessels known as Uncinate process of panx.

② Neck :: the narrow portion between head & body.

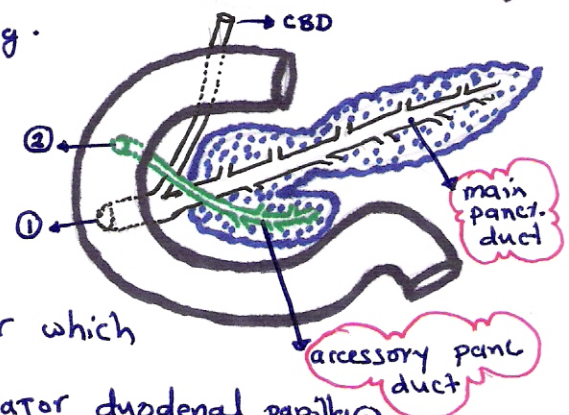
③ Body :: It is "triangular" in cross section with 3 borders & 3 surfaces. the surfaces are: anterior^④, posterior^⑤ & inferior^⑥ the borders are: upper, anterior & lower.



④ Tail :: It is embedded in the hilum of spleen & passes inside the Lieno-renal lig.

■ The pancreas has 2 ducts:-

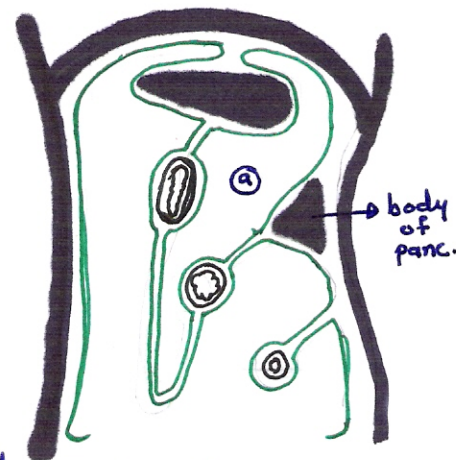
① main pancreatic duct :- from tail to head and unite with common bile duct (CBD) to form ampulla of Vater which opens into 2nd part of duodenum in major duodenal papilla^①



② accessory panc. duct : from uncinata process, it passes in front of main duct & opens one inch above major papilla (in 2nd part of duodenum) known as minor duod. papilla^②

* PERITONEAL COVERING:

- The pancreas is a retroperitoneal organ, lies behind the lesser sac of peritoneum (a)
- the head covered anteriorly (also the neck)
- the body is covered at the anterior & inferior surfaces and from the ant. border arise the transverse mesocolon.
- The tail is involved in the lienorenal ligament (lig. between the hilum of spleen & Lt kidney).



* RELATION:

* HEAD: ant.:- transv. colon & coils of small intestine.

post:- I.V.C, renal vein, bile duct [uncinate process to abd. aorta].

* NECK: ant:- 1st inch of 1st part of duodenum & pylorus of stomach.

post:- formation of portal vein.

* BODY:- ant. surface → to stomach (forming stomach bed).

inferior surface → to duodeno-jejunal junction & coils of small intestine.

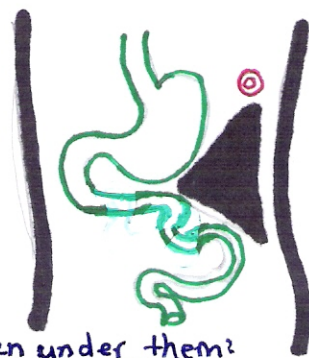
posterior surface → splenic vein & Lt renal vein then under them:

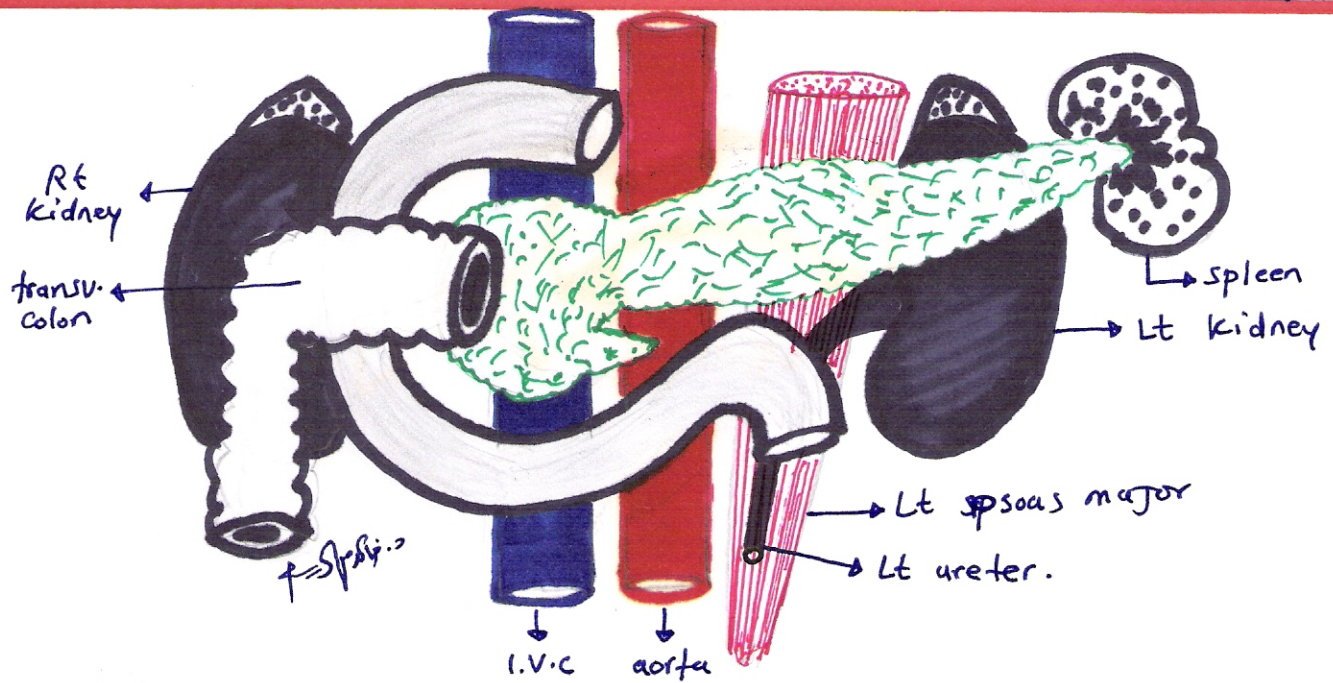
- Abd. aorta, Lt psoas ms., Lt kidney & suprarenal gland.

upper border → to splenic artery.

ant. border → gives attachment to transv. mesocolon.

* TAIL: related to hilum of spleen.



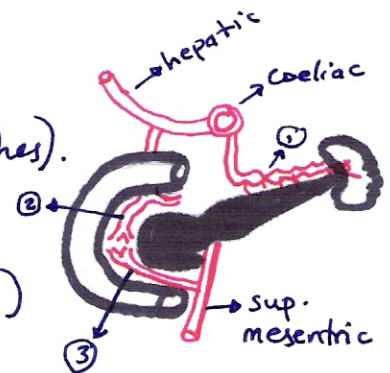


* BLOOD SUPPLY :

* ARTERIA SUPPLY :- by

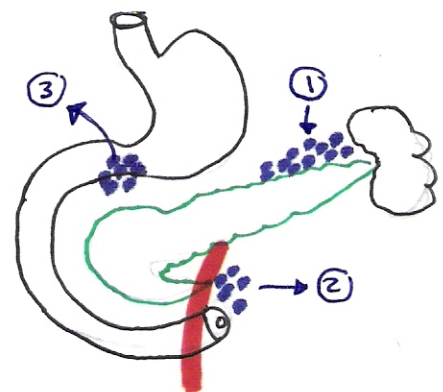
- ① splenic artery (it is tortuous & gives pancreatic branches).
- ② superior pancreaticoduodenal → (coeliac artery)
- ③ Inferior pancreaticoduodenal → (superior mesenteric a)

* VENOUS DRAINAGE: to portal vein.



* LYMPHATIC DRAINAGE :

- = Mainly to pancreatico-splenic group of L.N ①
- = Also to superior mesenteric group ② and pyloric L.N. ③.



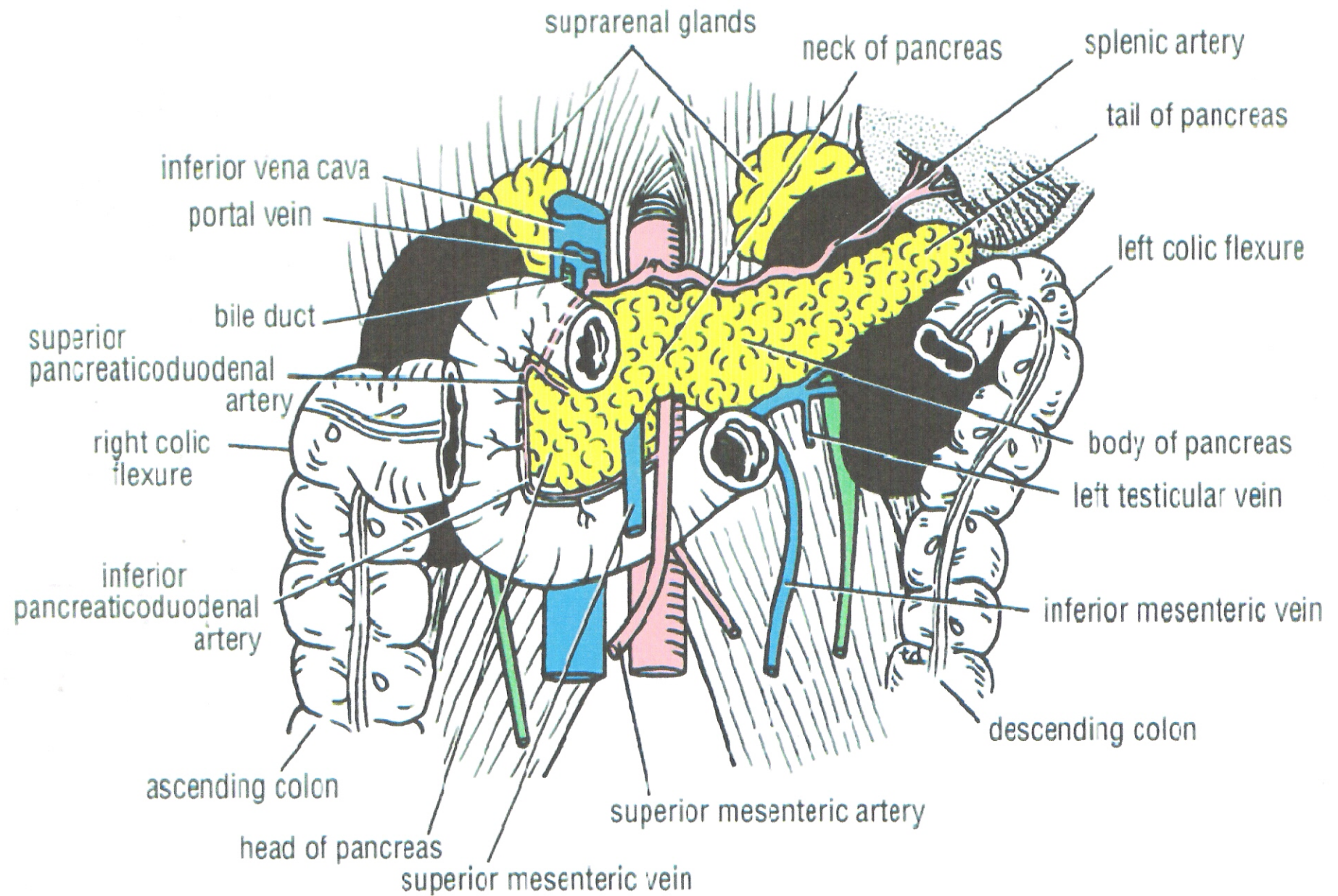


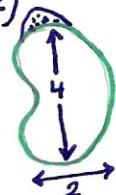
Figure 5-26 Pancreas and anterior relations of the kidneys.

KIDNEY

- The two kidney lie on post. abd. wall on sides of the vertebral column (reddish brown).
- The Lt kidney is higher ($\frac{1}{2}$ inch) than the Rt (due to liver).
- The kidney is about 4 inch (long), 2 inches (wide), 1 inch (thick)
- The kidney has two ends:

upper end (pole) $\rightarrow$ related to suprarenal gland.

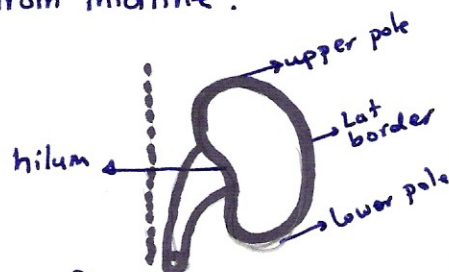
lower end (pole) $\rightarrow$ pointed & slightly away from midline.



- The kidney has two surfaces:
anterior surface & posterior surface.

- The kidney has two borders:

Lateral border & medial (which has hilum on it).



- * - The hilum gives passage to: $\rightarrow$

V. A. U. A

V $\rightarrow$ renal vein.

A $\rightarrow$ " artery (2 branches).

U $\rightarrow$ Ureter.

A $\rightarrow$ renal artery (3rd branch).
with nerves & lymphatics

- Renal vein (anterior)
- Renal artery (middle)
- Pelvis of ureter (posterior)
- Nerves & Lymphatic

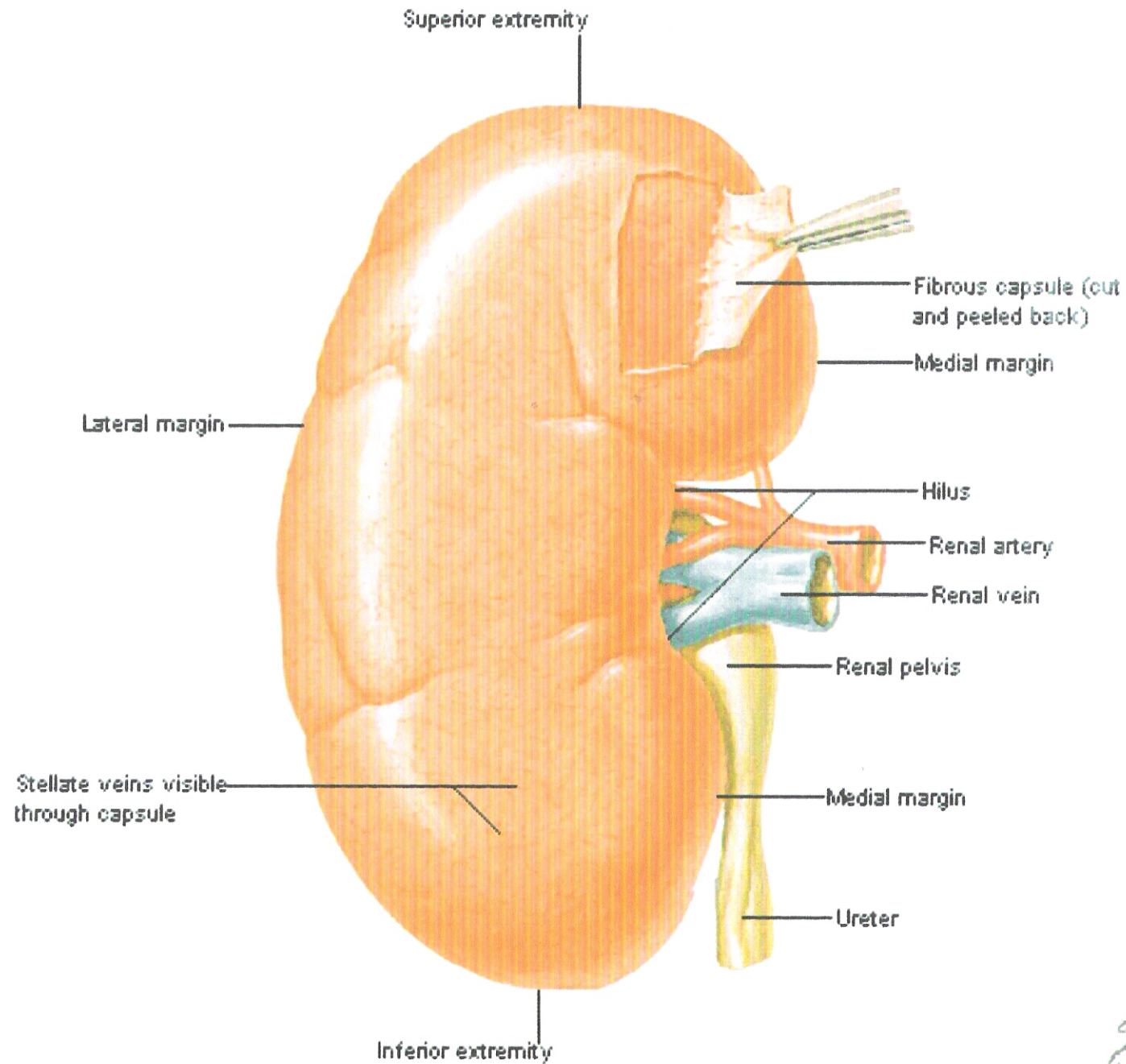
- * - HOW TO IDENTIFY KIDNEY (Rt or Lt)

- Hilum $\rightarrow$ medial

- Ureter $\rightarrow$ Directed downward.

- Pelvis $\rightarrow$ posterior (or Renal vessel anterior)

Anterior Surface of Right Kidney

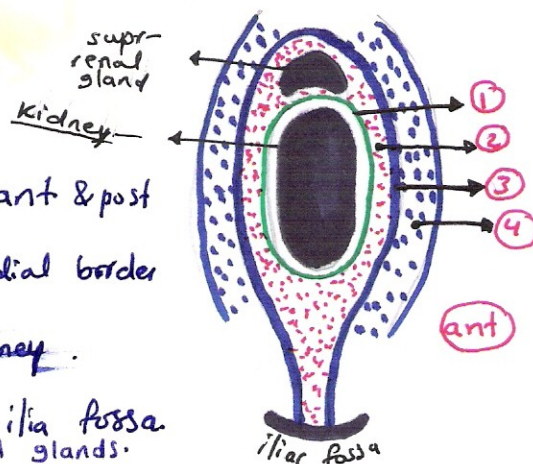


— The kidney is surrounded from inside to outside by

- ① Fibrous capsule.
- ② Peri-renal fat.
- ③ Renal fascia : consist of 2 layers ant & post and closed above & medial border & lateral border of kidney.

— it's attached below to ilia fossa.
— enclose kidney & suprarenal glands.

- ④ Para-renal fat. —→ forms part of retro-peritoneal fat
— perirenal fat, renal fascia & para-renal fat support & held kidney in position

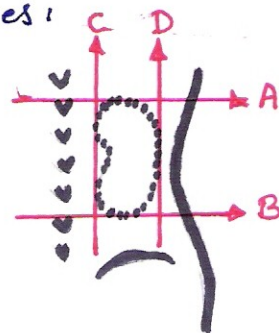


* SURFACE ANATOMY :

— from posterior view:

— Kidney is drawn between 2 vertical & 2 horizontal planes:

- (A) upper horizontal: at level of 11th thoracic spine.
- (B) lower " " " " " 3rd Lumbar " "
- (C) Medial vertical line: 1 inch from median plane.
- (D) Lateral " " : 3 " " " " "



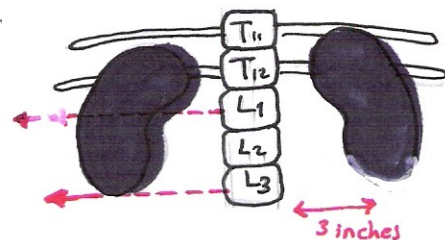
— from anterior view:

— Hilum * lies at L₁ (transpyloric plane)
(Rt kidney lower by 1/2 inch)

— Upper pole reaches 11th rib (the Rt

kidney reaches 11th I. Costal space) & it's 1 inch from midline.

— lower pole reaches level of L₃ & is 3 inches from midline.
(subcostal plane)



* RELATION :

● POSTERIOR RELATION :-

* Kidney is related posteriorly to :

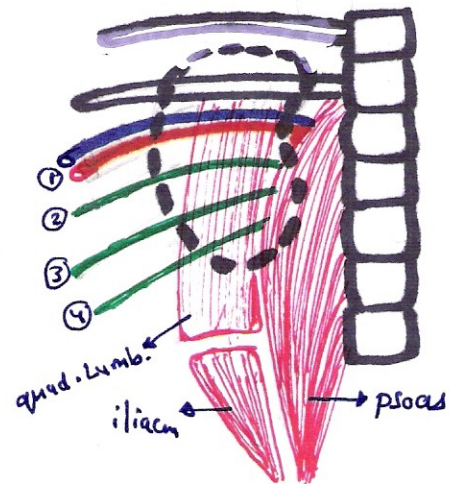
- 11th rib, 11th intercostal space & 12th rib.

((the Rt Kidney is lower & don't reach the 11th rib)). $\Rightarrow$ separated by diaph.

- Psoas major, quadratus lumborum & transversus abdominis muscles.

- above the quadratus there is :

- Subcostal vessels^①, subcostal nerve^②, iliohypogastric^③ & ilioinguinal N.^④



● ANTERIOR RELATION :-

* Rt Kidney : ① Rt suprarenal gland.

② Small intestine.

③ Rt colic flexure.

④ Liver (Rt lobe).

⑤ Duodenum (2nd part)

* Lt Kidney : ① Lt suprarenal gland.

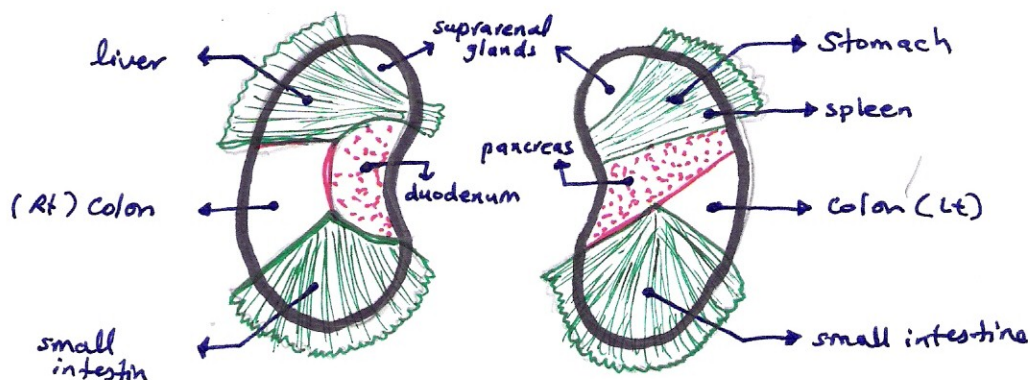
② Small intestine.

③ Lt colic flexure.

④ Stomach.

⑤ pancreas (body).

⑥ spleen.



* PERITONEAL COVERING :

- The kidney is a retroperitoneal organ.
- The Rt kidney has (anteriorly) peritoneal covering derived from small intestine & liver.
- The Lt kidney has (anteriorly) peritoneal covering derived from small intestine, stomach & spleen.

* BLOOD SUPPLY :

- **ARTERIAL** :- from :-
 - Renal artery: branch of abd. aorta at the level of upper border of (L2) vertebra.
 - accessory renal a :- (in 30% of people) from aorta just above or below renal artery.

- **VENOUS** : to renal veins which drain into inf. vena cava.

Left renal vein receive

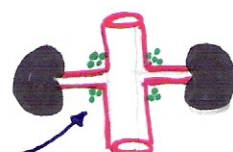
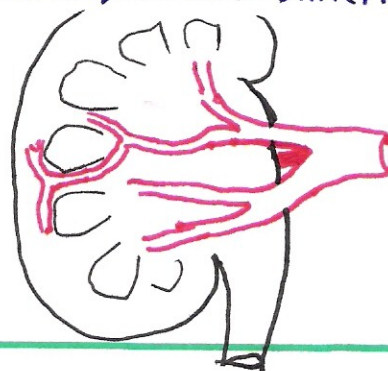
- Lt gonadal vein
- Lt suprarenal vein.
- inferior hemiazygos vein.

* LYMPHATIC DRAIN :

- To lateral aortic L.N (around origin of renal artery)

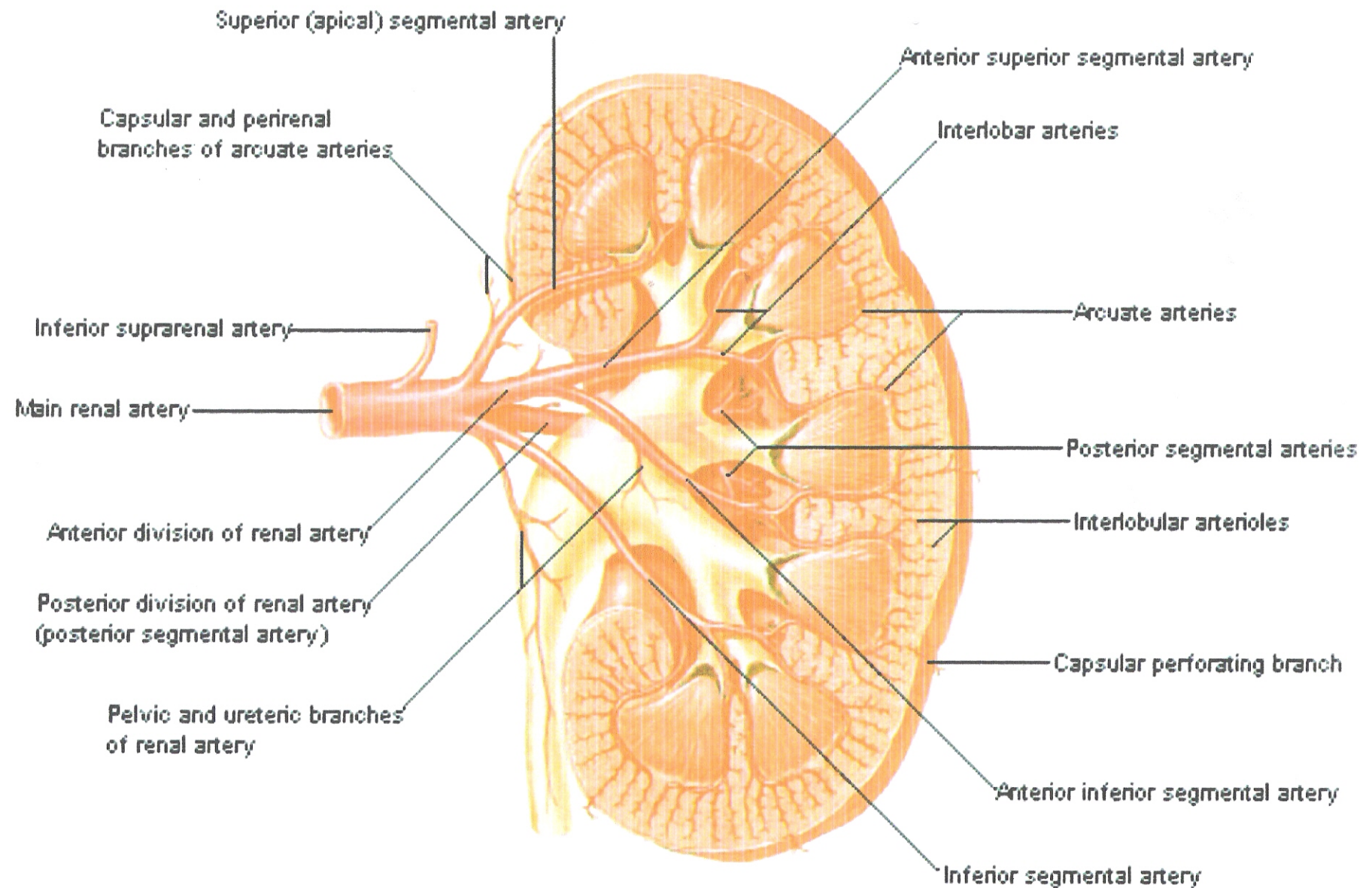
N/S :- by renal symp. plexus & afferent fibers enter spinal cord in T10, 11 & T12 (4 in front pelvis 1 behind)

[NB] Renal artery. gives → 5 segmental branches → gives lobar arteries
 each lobar gives → 2-3 interlobar arteries → gives arcuate arteries (between cortex & medulla) → gives interlobular arteries that ascend to cortex → gives afferent glomerular arteries
 [Renal → segmental → lobar → interlobar → arcuate → interlobular → afferent glomerular arteries]



Intrarenal Arteries

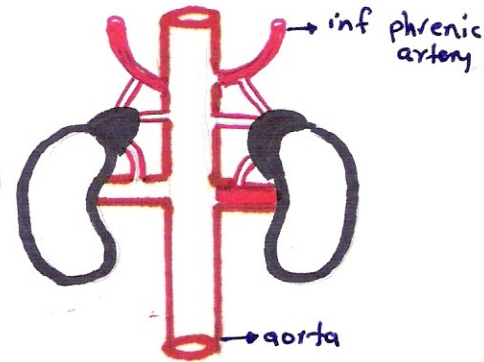
Frontal Section of Left Kidney - Anterior View



SUPRA-RENAL GLAND

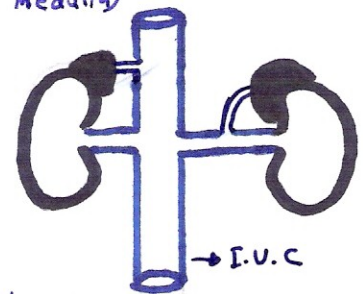
* DESCRIPTION :

- The two suprarenal glands are situated at the upper pole of each kidney. (yellowish)
- The Rt is pyramidal in shape while the Lt one is crescent (semilunar).
- It is a retroperitoneal organ. (yellow cortex & dark brown medulla)



* BLOOD SUPPLY :

- ARTERIAL : ① superior suprarenal artery: branch of inferior phrenic a.
- ② Middle suprarenal from abd. aorta.
- ③ Inferior suprarenal from renal artery.



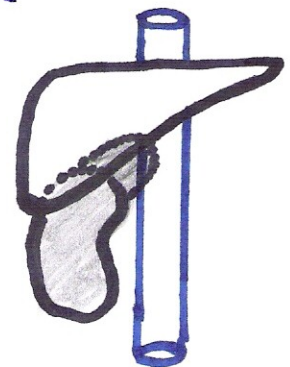
- VENOUS : ■ Only one suprarenal vein from each gland
- the Rt suprarenal vein drain into → inf. vena cava &
- the Lt suprarenal vein → Lt renal vein.

* N/S : mainly preganglionic symp. fibers derived from splanchnic nerves and majority end in medulla.

* RELATION :-

Rt Gland : ant : inf. vena cava & liver (Rt lobe)
post : diaphragm.

Lt Gland : ant : pancreas, stomach & lesser sac.
post : diaphragm.

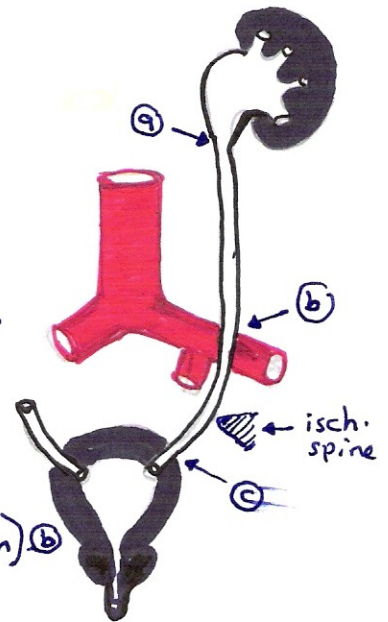


* Lymph drainage : to lateral aortic LN

URETER

* DESCRIPTION :

- The ureter is 10 inches (25 cm) long, half of it in the abdomen proper & lower $\frac{1}{2}$ in pelvis.
- The ureter is divided into 3 parts:
 - ① abdominal part.
 - ② pelvic part (after crossing common iliac artery).
 - ③ intramural part (inside wall of urinary bladder).
- The ureter has 3 constrictions:
 - ① At pelvi-ureteric junction. ①
 - ② At crossing of common iliac artery (at pelvic brim) ②
 - ③ Intramural part (narrowest portion).



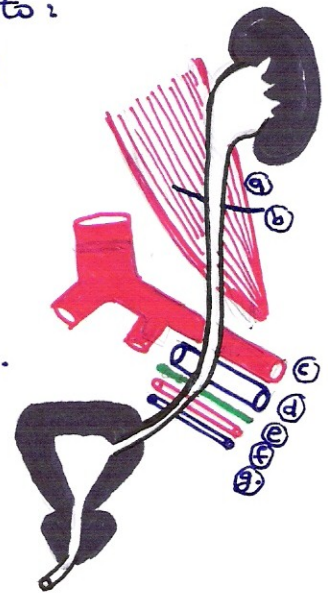
* COURSE :

- The ureter starts as a continuation of renal pelvis (at lower border of kidney) and runs at ant. surface of Psoas major (retroperitoneal) then enters the pelvis by crossing ^{sacro-iliac joint} the beginning of the external iliac artery (crossing bifurcation of common iliac).
- Then the ureter runs backward, downward along the lower border of internal iliac a till the ischial spine where it curves forward & medially to enter the postero-superior angle of bladder.

* RELATION:

I. POSTERIOR: the 2 ureters are related posteriorly to:

- psoas major & minor^(a) and genito femoral N.^(b)
- Ext. iliac artery & vein.^(c)
- obturator N.^(d)
- obturator artery & vein^(e) (respectively)
(Psoas separate it from lumbar transv. processes).



II. ANTERIOR:

Rt ureter

- ① Third part of duodenum & root of mesentery.
- ② R gonadal vessels
- ③ Rt colic vessels
- ④ ilio colic vessels
- ⑤ ileum (terminal part)

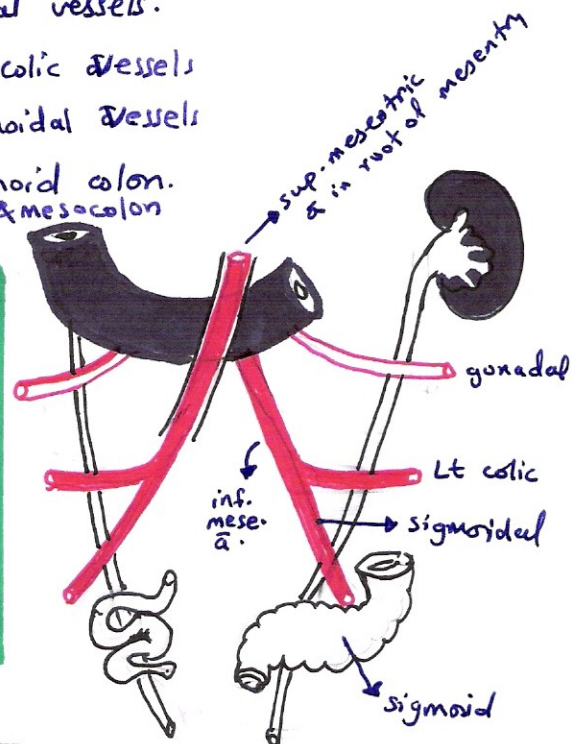
Lt ureter

- ① gonadal vessels.
- ② Lt colic vessels
- ③ sigmoidal vessels
- ④ sigmoid colon & mesocolon

[NB] Both ureters are crossed in the pelvis by:

- vas deferens in male or
- uterine artery in female.

[N.B.] inferior mesenteric vein lies along medial side of the left ureter



* Blood supply:

[Lymph] → into lateral aortic & iliac LN.

- upper end: renal artery. (N/S from renal plexus)
- Middle part: gonadal artery. (N/S from gonadal plexus)
- in pelvis: superior vesical artery. (N/S from sup. vesical plexus)
- afferent fibers travel with symp. enter spinal cord at L₁, L₂

SYMPATHETIC TRUNK

"Abdominal Part"

- continuous above with thoracic & below with pelvic parts of sympathetic trunk.
- Runs downward along medial border of Psoas on bodies of lumbar vertebrae.
- Enters abdomen behind medial arcuate ligament.
- Enters pelvis behind common iliac vessels.
- (Rt trunk behind IVC, Lt trunk at left side of aorta).
- It has 4-5 segmentally arranged ganglia (1st & 2nd often fused).

* Branches of symp. trunk :-

1. White rami communicantes :- from 1st 2 ganglia to L₁, L₂ nerve
2. Gray rami communicantes :- from each ganglion to all Lumbar N.
3. branches to abdominal aortic plexus.
4. branches forming superior hypogastric plexus.

AORTIC PLEXUS :-

- Consists of :- 1- preganglionic & postganglionic ↑ symp. fibers
- 2- visceral afferent fibers.
- site :- abdominal aorta around origin of
 - ← Coeliac
 - ← sup. mesenteric artery.
 - ← inf. mesenteric artery.

1) Coeliac plexus :-

- consists of 2 coeliac ganglia connected by fibers network.
- Ganglia receive preganglionic symp. fibers from
 - ← greater splanchnic N.
 - ← lesser " "
- [N.B] :-
- Post. ganglionic branches & parasymp. vagal fibers accompany the branches of coeliac trunk.

[2] Superior mesenteric Plexus :-

- smaller than celiac plexus ganglia.
- receive preganglionic symp. fibers from

greater splanchnic nerve

lesser " ~
- MeB (Parasymp. from vagus)
- Post-ganglionic runs along branches of sup. mesenteric artery.

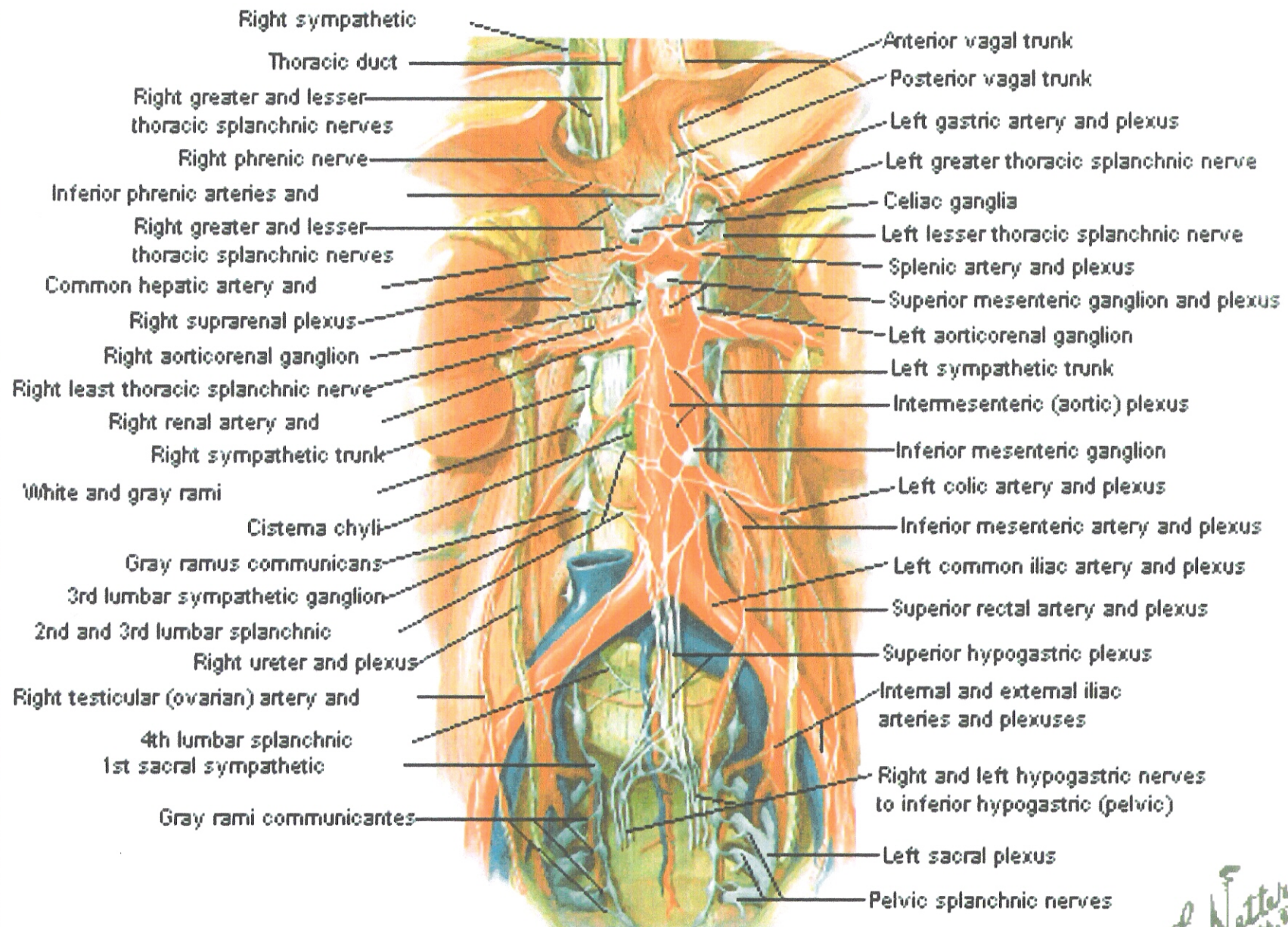
[3] inferior mesenteric Plexus :-

- Similar ~~but~~, receive preganglionic from $\begin{cases} \text{greater splanchnic N.} \\ \text{lesser splanchnic N.} \end{cases}$
- post ganglionic (parasymp. from S2,3,4) distributed with inf. mes. artery

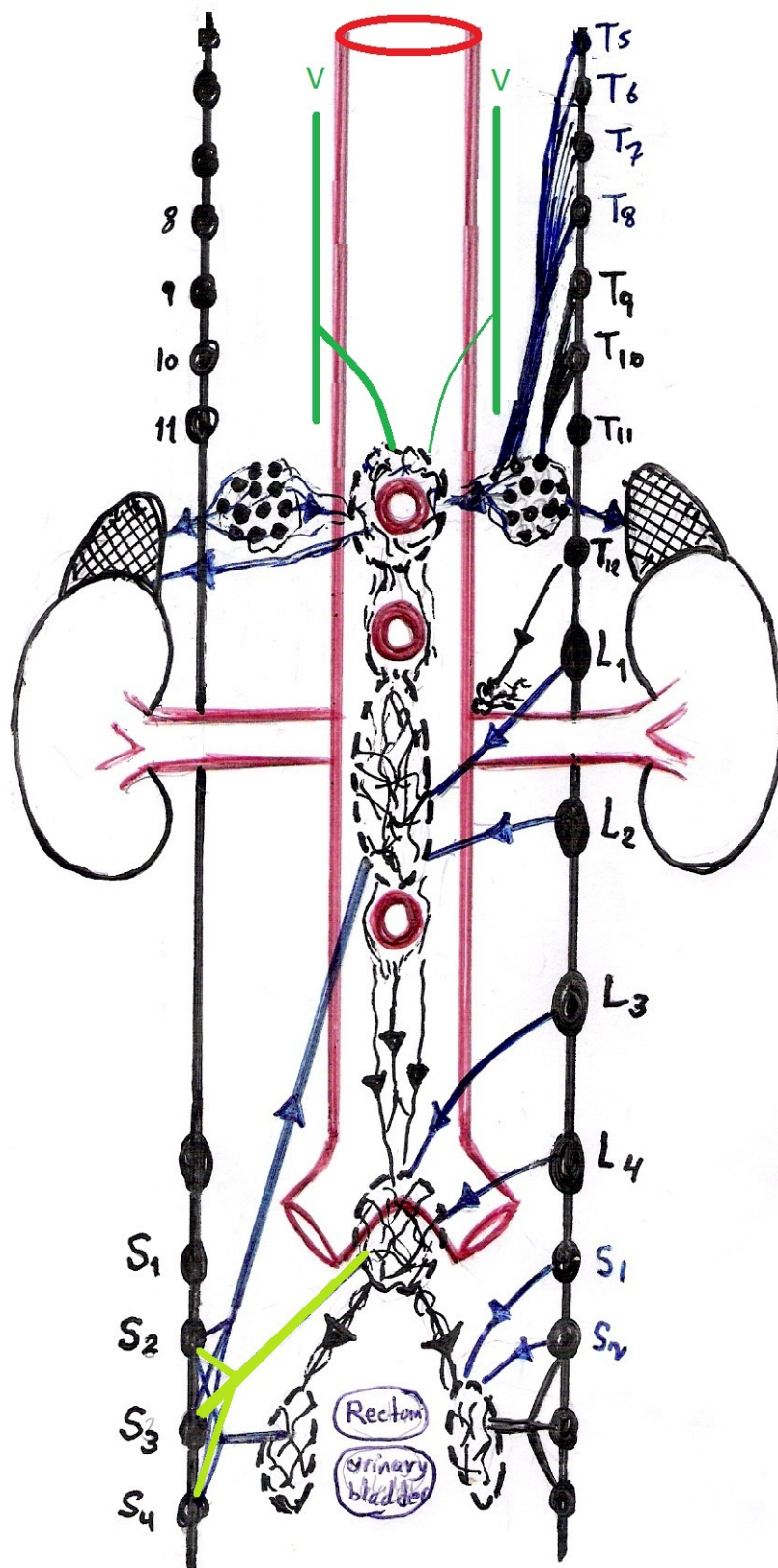
[4] Renal Plexus

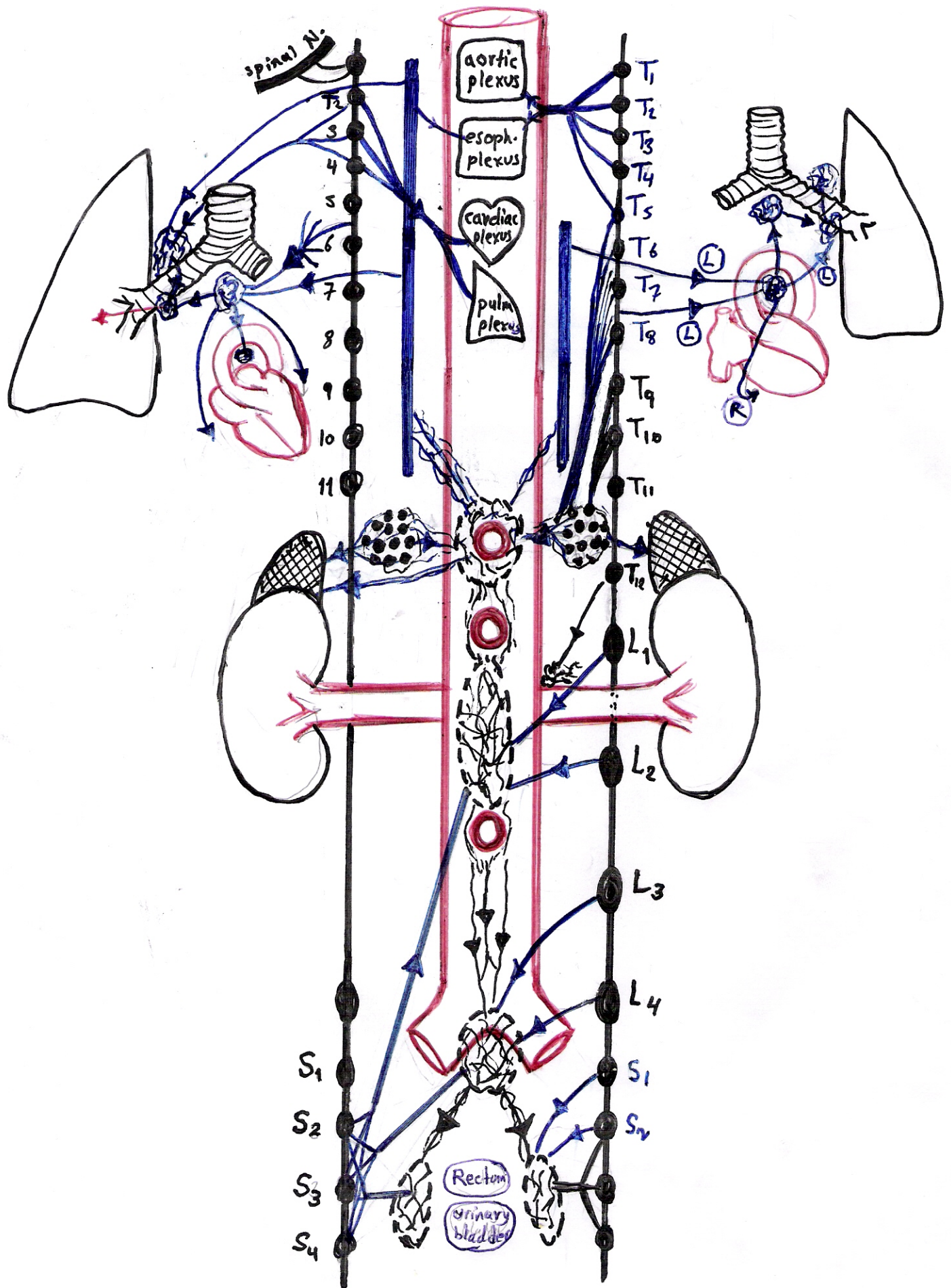
- smaller than coeliac plexus.
- receive preganglionic symp. fibers from
 - greater splanchnic N.
 - lesser ~ ~
 - lowest splanchnic symp. N.
- **N.B**
- Post-ganglionic branches & Parasymp. vegal fibers distributed along renal artery branches.

Autonomic Nerves and Ganglia of Abdomen



L. Natter
M.D.





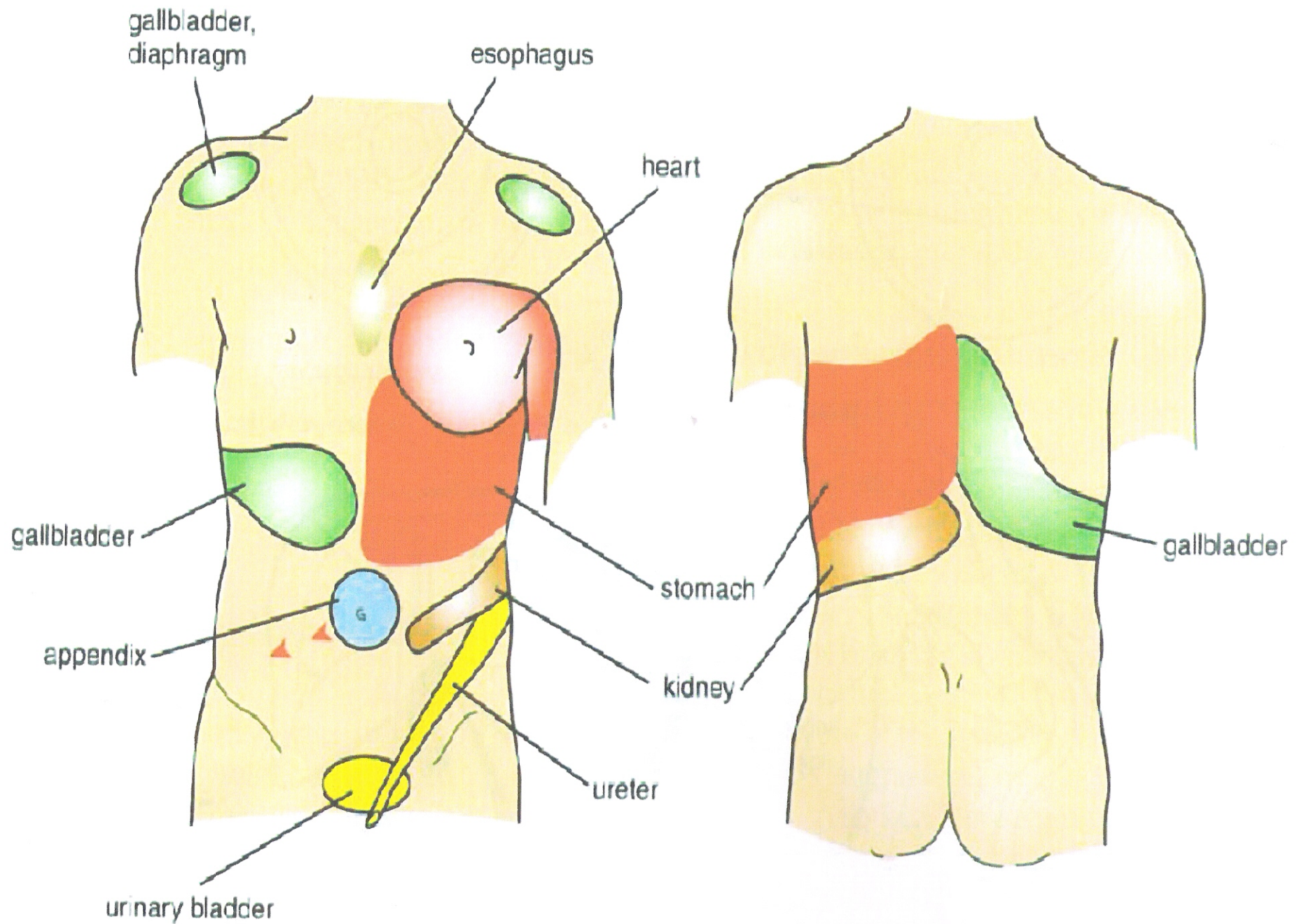


Figure 5-17 Some important skin areas involved in referred visceral pain.

1

CLINICAL NOTES OF ABDOMEN

① Surgical incision :-

- Surgical incision should be made along line of cleavage in abdomen to avoid ugly scar.

② Portal hypertension :-

- Liver cirrhosis & portal vein obstruction → cause Portal hypertension → causing varicosities at porto systemic anastomosis sites as:
 - a- esophageal varices → hematemesis (vomiting^{of} blood)
 - b- Piles (hemorrhoids) → bleeding per rectum.
 - c- Caput medusa (around umbilicus).

③ Varicocele :

- Varicosity of Pampiniform plexus, common in young adult, more in left side (90%) due to
 - a- Lt gonadal (testicular) vein opens into Lt renal vein by right angle
 - b- Lt vein has a longer course than Rt one.
 - c- Lt vein may be compressed by sigmoid colon.
- If it occurs in old age may be secondary to tumour of Lt kidney → rapid varicocele.

④ Varicose veins :-

- Varicosity is dilated tortuous vein.
- It may be — Primary: due to valve incompetence.
 - Secondary, e.g due to I.V.C obstruction

⑤ Vasectomy :-

- Ligation & division of vas deference → infertility
- done under local anaesthesia.

①

⑥ Testicular torsion :-

- Rotation of testes around spermatic cord which if not treated quickly → testis necrosis.

⑦ Psoas abscess :-

- Accumulation of tuberculous abscess in the thigh (under inguinal ligament) by spread of abscess from TB of thoraco-lumbar vertebra under Psoas sheath.

⑧ Meckel's diverticulum :

- Proximal unobliterated part of vitello-intestinal duct, clinically may be mistaken for appendicitis
- It is called disease of 2 → 2 inches (5cm) long
→ 2 feet (60 cm) from ileo-cecal junction
→ 2 % of population
→ 2:1 male: female
→ contain 2 mucosa ← gastric pancreatic

⑨ Abdominal stab wound :- it Penetrates following layers

(a) Lateral to rectus sheath

- 1- skin
- 2- fatty layer
- 3- Membranous layer
- 4- thin deep fascia
- 5- external oblique
- 6- internal oblique
- 7- transversus abdominis
- 8- fascia transversalis
- 9- extraperitoneal tissue
- 10- parietal peritoneum

(b) Anterior to rectus sheath

- 1- skin
- 2- fatty layer
- 3- memb. layer
- 4- thin deep fascia
- 5- anterior wall of rectus sheath.
- 6- rectus ms & N. & vessels
- 7- post. wall of rectus sheath
- 8- fascia transv.
- 9- extraperit. tissue
- 10- Parietal Perit.

(c) in midline

- 1- skin
- 2- fatty layer
- 3- membr. layer
- 4- thin deep F.
- 5- linea alba
- 6- fascia transv.
- 7- extraperit. tissue
- 8- parietal peritoneum

⑩ Visceroptosis :-

- prolapse of viscera due to weak abdominal wall as in case of multiple pregnancy in middle aged female.

(11) Paracentesis :-

- taking sample of peritoneal fluid by a needle for diagnosis of ascitis.

(12) Ascitis :-

- Accumulation of serous fluid in peritoneal cavity, it may be caused by liver cirrhosis, malignancy, tuberculosis -----etc.

(13) Volvulus :-

- rotation of intestine around it's mesentery which can $\rightarrow$ necrosis (by cut of blood supply).

(14) Intussusception :-

- invagination of part of intestine into other part distal to it $\rightarrow$ intestinal obstruction

(15) Peptic ulcer :-

- can occur at any site but commonest in the duodenum (at posterior wall of 1st inch) then in stomach (at lesser curvature).

(16) Colonoscopy :-

- endoscopy of colon can be used to diagnose colorectal carcinoma, bleeding ----etc or taking biopsy or for treatment (as stop bleeding).

(17) Diverticulosis :-

- herniation of mucosa through wall of colon,
- commonest site at sigmoid colon.

(18) Gall stones :-

- usually a symptomatic.
- may complicated by $\left\{ \begin{array}{l} \text{Biliary colic} \\ \text{acute cholecystitis} \\ \text{Jaundice (obst. of CBD)} \\ \text{pancreatitis (at ampulla).} \end{array} \right.$

(19) Rectus sheath hematoma :-

- uncommon, usually occur on Rt side below umbilicus by trauma $\rightarrow$ hematoma.

(20) Acute chole-cystitis ::

- acute inflammation of gallbladder → Pain in Rt hypochondrial area which referred to Rt shoulder [by irritation of diaphragm that supplied by phrenic "C3.4.5" → referred to skin of shoulder which supplied by supraclavicular N. "C3.4"].

(21) Cushing's syndrome ::

- Adreno-cortical hyperplasia or adenoma.
- manifested by ::
 - moon shaped face.
 - trunkal obesity.
 - hirsutism.
 - hypertension.

(22) Addison's syndrome ::

- Adreno-cortical insufficiency.
- manifested by ::
 - weight loss, ms weakness.
 - ↑ pigmentation.
 - hypotension.

(23) Pheochromocytoma ::

- tumour of adrenal medulla → ↑ catecholamines which → sustained hypertension.